

Analysis of Traditional Korean Space and its Application to A Contemporary Problem: A Crematorium

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Submitted to the Department of Architecture
in partial fulfillment of the requirements for the degree
MASTER IN ARCHITECTURE at the
Massachusetts Institute of Technology

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for the priests who built Korean temples

**this thesis would not have been
possible without the help and
support of my friends and family**

KOREA has experienced an industrial age severely discontinuous with the past. Not having the time to properly develop its own paradigm for modern industrialism, Korean architecture has deserted traditional vocabulary for pseudo-Moderistic forms. The numerous economical and faceless boxes have left the Korean people culturally bereft. Herein lies the tragedy of Korean architecture in the 20th century.

In the 70s and 80s, many Korean architects tried to derive their own architecture from the traditional one but succeeded only in imitating forms and evoking superficial images. Their difficulty lay in balancing two conflicting ideas: Korean modern architecture and modernized Korean architecture.

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Abstract

This is more of an experimental design thesis rather than a theoretical research-oriented thesis on the history of Korean Architecture. Ultimately, a design of a concrete building, a crematorium, will be the final product of this thesis and will serve as a vehicle with which to experiment with my ideas in the design process. There is a strong driving force in this thesis: the aspiration to interpret the architecture of my ancestors with a fresh eye - in light of spatial organization. Thus, it was a necessary first step to visit a few historical buildings to experience the spaces themselves, following with an analysis of the plan afterwards. Throughout my own study, some assumptions were drawn as design guidelines for the design of a crematorium.

The critical issue of this design thesis centers on the evolution of 'Non-diagrammatic Space' from 'Diagrammatic Space' in the history of Korean architecture. Designing a building has been thought a complex process which relates political, economical, and social factors at the same time. But, though we know this intuitively, a design methodologist recently proved that most designs are generated not by listing all constraints but by starting with a 'prime generator'. In this context, the diagrammatic Korean temples are good illustrations of the 'Prime Generator'. But my main concern lies in ideas that cannot be easily explained by the notion of prime generator in the non-diagrammatic temples, which were the outgrowth of deep contemplation and a process of trial and error through hundreds of years.

Thesis Supervisor: Thomas Chastain
Title: Assitant Professor of Architecture

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First of all, I would like to express my heartfelt thanks to Professor Thomas Chastain and to the School of Architecture at MIT, where I have grown more mature as a designer and had the opportunity to write this thesis. For the last two years as an M. Arch student, the philosophy of the MIT design studio has gradually captivated my mind and now I dare to say that the unique tradition of MIT's School of Architecture has changed my way of thinking a great deal. I hope MIT keeps this proud tradition as one of the few places in the world where one can really think about space and architecture. However, if there had not been the guidance and help of Professor Thomas Chastain, I could not have understood what MIT wants to teach me and this thesis would have been impossible. Thank you again, Tom! It was my great pleasure working with you. Also, many thanks to all who have given me their support and encouragement and helped me to survive at MIT.

To my readers, Bill Hubbard and Imre Halaaz, for their incisive criticism
To the HTC professors, Stanford Anderson and Francesco Passanti, from whom I learned architectural history and theory.

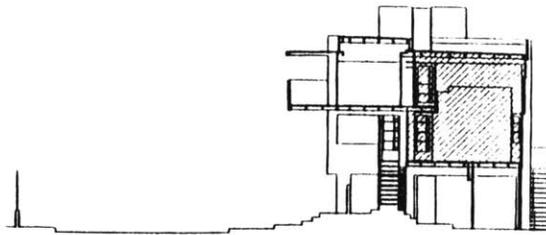
To Jane Lee who helped me to edit this text.

To fellow students who advised and encouraged me up to the last minute of this term: Mark, Sue, John, Olivier, Emily, and Wael.

I. INTRODUCTION

1.1 Form versus Space

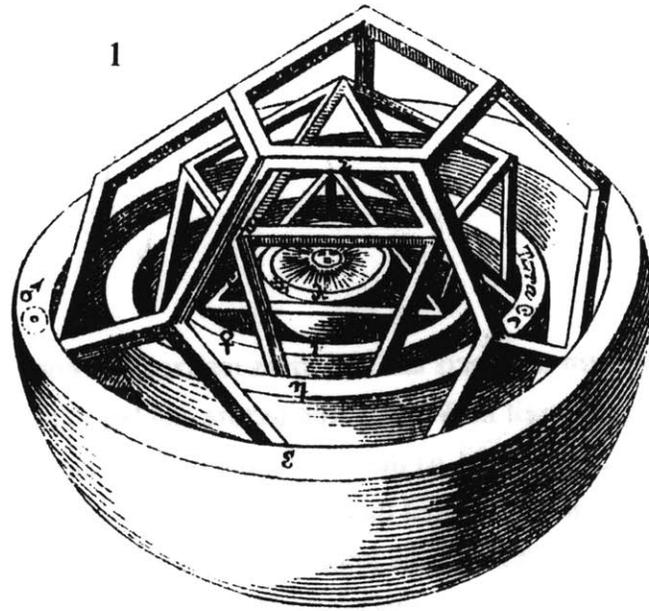
At the turn of the last century, Western architects and historians realized that not much attention had been paid to space itself in Western architecture and began to re-evaluate and define architecture accordingly. At this revolutionary moment, even an architect like Rudolf M. Schindler declared that he had found a 'new' medium of architecture - S.P.A.C.E.. What was the impetus for this almost abrupt phenomenon? Can we infer from this pronouncement by Schindler that the existence of space had been totally ignored in the design process of Western architects? How could this omission occur in architecture, the supposed art of space?



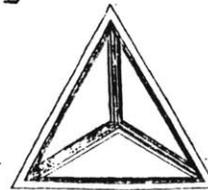
R. M. Schindler, Lovell Beach House, Newport Beach, 1922-26, Section through living area.

Schindler's manifesto: Vienna 1912

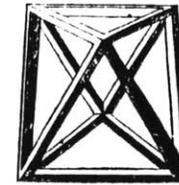
.... The technique of architect and sculpture were similar. The vault was not the result of a room concept, but of a structural system of piling masonry to support the mass enclosure. The decoration of the walls was intended to give the structural mass a plastic face. These old problems have been solved and the styles are dead Because of the lack of a plastic mass the shape of the inner room defines the exterior of the building. Therefore the early primitive product of this new development is the "box-shaped" house. The architect has finally discovered the medium of his art: S P A C E



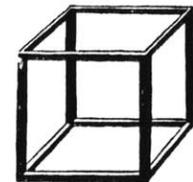
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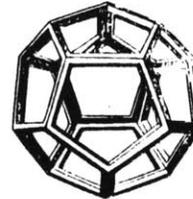
Fire: the Pyramid (4 planes)



Air: Octahedron (8 planes)



Earth: Cube (6 planes)

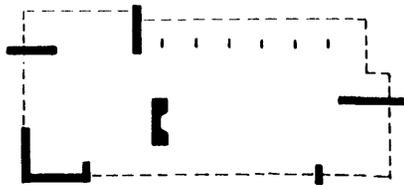
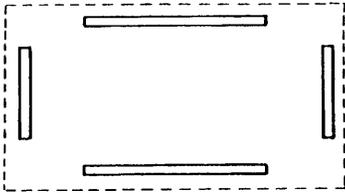
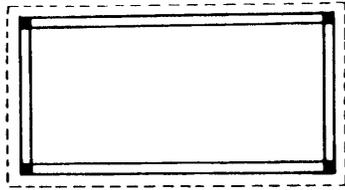


Cosmos: Dodecahedron (12 planes)



Water: Icosahedron (20 planes)

1. The five Platonic solids composing the universe after Johann Kepler.
2. The five Platonic solids drawn by Leonardo da Vinci, Venice, 1509.



3. A: typical room with walls joined at four corners. B: Wright's first step-eliminate the corners, thus turning the walls into freestanding, movable slabs. C: Wright's second step-define, by reassembling segments of these slabs, a new spatial context that intergrates the former functions of the demolished rooms; this is a schematic plan of a Usonian house. (H. Allen Brooks: Wright and the destruction of the box 1979)

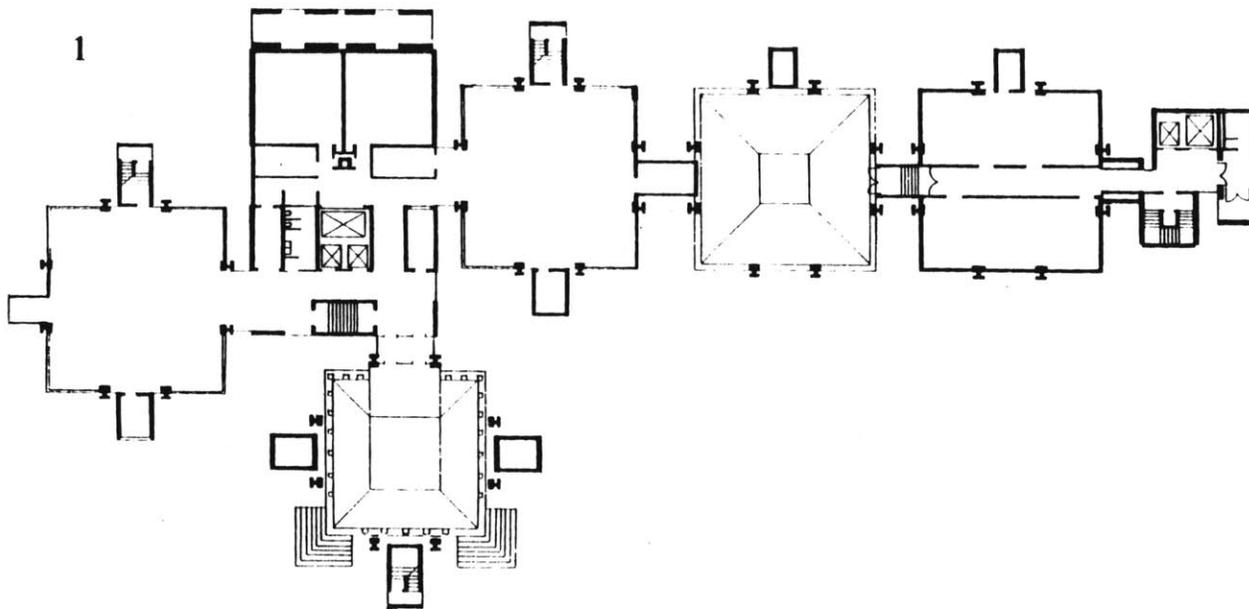
To fully understand Schindler's famous manifesto or Wright's 'breaking of the box,' it seems important to understand the Western pursuit of "ideal form." This near obsession originated with the great ancient philosopher Plato, whose universal system comprised five Platonic forms. The influence of Platonic ideas on Western architectural theory compelled even the later Renaissance architects to see architecture as the plastic embodiment of universal proportions and to endeavor to search endlessly for ideal forms. I believe that the notion of form in Western architecture has always included the notion of space. In fact, the meaning of form has been a two-faced janus of pure form and space. Thus, Western architects have not needed to pay any particular attention to space itself. Louis Sullivan's famous statement "Form follows function" could be interpreted as "Space follows function" in this sense.

Though the western architects have liberated their consciousness from the constraints of ideal form with the declaration of space as the new medium of architecture, we still witness the habitual repetition of ideal forms in their designs. Louis I. Kahn might best exemplify the recurrent desire for ideal form. Kahn's first well-known building, the Richards Medical Laboratory, featured a "Scientist's ideal form" with four cozy corners. In this building, Kahn's generating assumption was that the scientist works alone or in a small team and then needs exposure to the entire group in a main collective space. However, through the failure of this building as a laboratory, we see the limitations of ideal

form in modern society. The actual use of the space of Kahn's ideal form was far from what Kahn had anticipated. Form followed fiasco.

1.2 Space: the Ultimate Theme of Korean Architecture

I have noticed a kind of similarity in design approach between the Richards Medical Laboratory and most of the modern Korean houses. In both cases, the higher priority is given to 'form' as a starting point. When we stick to form as a design generator, the internal spatial structure and outer shape of the building become very clear and distinctive, tending to make the building itself an object isolated from the surrounding environment.



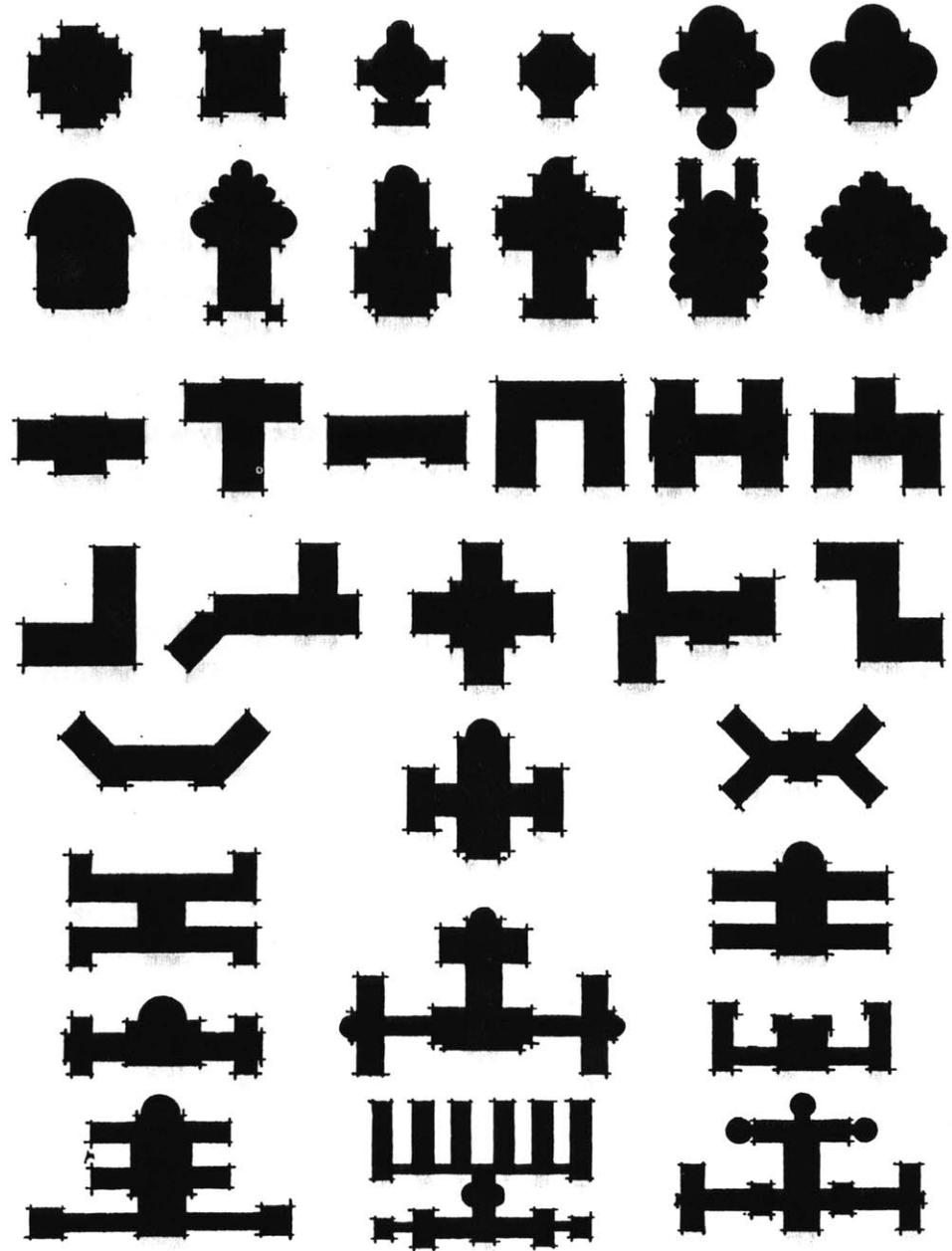
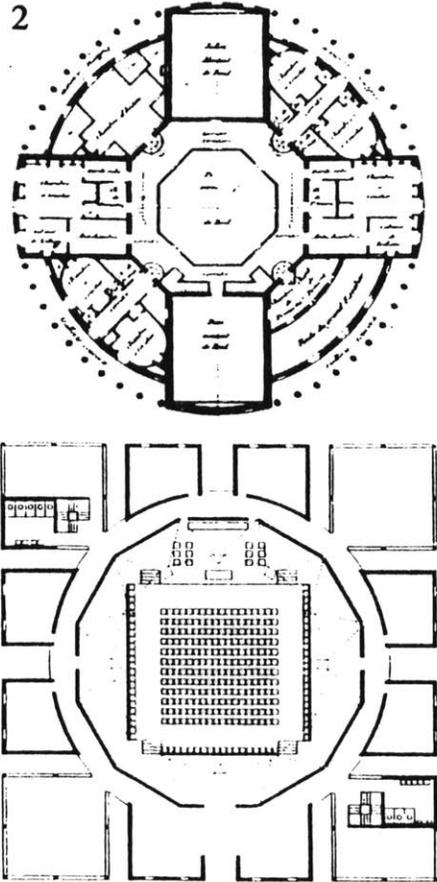
1. Louis I. Khan: Richards Medical Laboratory, which comprises forms idealized for scientists. But, the building turned out to be a failure as a laboratory space. Later, after the lessons learned from the Richards Medical laboratory, Khan designed the Salk Institute in a manner that deserted ideal form.

2. A typical Western plan based on Platonic form.

Khan's plan showing an effort to create an architecture of ideal form. Note the similarity between the two plans.

3. Plans of ideal forms, forms, and forms.

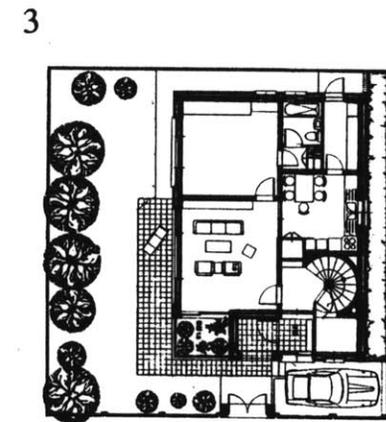
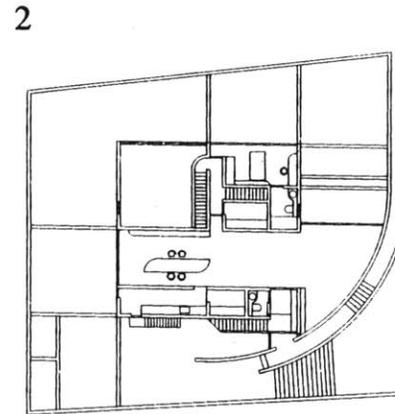
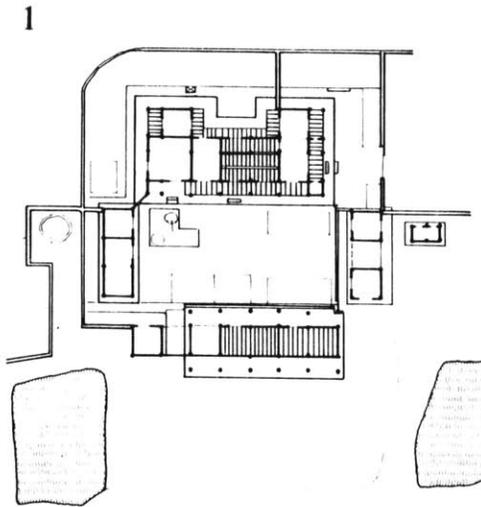
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In traditional Korean houses, the space between garden wall and house was carefully treated and well utilized by Koreans. But the modern Korean houses seem to have lost this quality as they have become increasingly isolated objects surrounded by walls. The importance of the space-between began to fade in the minds of the Korean people with the influx of Western culture. But a thoughtful Japanese architect seems to have found the forgotten potential of Korean architecture. In most of Tadao Ando's houses, the space-between is not mere left-over space formed from an object-like house. The whole site is conceived as one body within which space and form coexist in harmonic order as in the traditional Korean architecture.

Traditional Korean architecture did not try to embody an 'ideal form' but instead strove without preconceptions for the most plausible architecture using natural forms. Thus, the designers were able to sidestep the pitfalls of sacrificing space to support form. Now, it is high time for Korean people to reconsider the value of space in architecture as one Western critic pointed out:

Criticism has singularly failed to recognize this supremacy in architecture of spatial values. The tradition of criticism is practical. The habits of our minds are fixed on matter we see. Matter is fashioned: space comes. Space is "nothing" - a mere negation of the solid. And thus we come to overlook it. But though we may overlook it, space affects us and controls our spirit, and a large part of the pleasure we obtain from architecture springs in reality from space.



1. Lee Keumjae House, a plan of a traditional Korean house built at the turn of the last century.
2. Kidosaki House, Tadao Ando, Tokyo, 1982-86, First floor plan.
3. A typical plan of a modern Korean house.

II. THE HIDDEN SECRETS OF A MILLENIUM

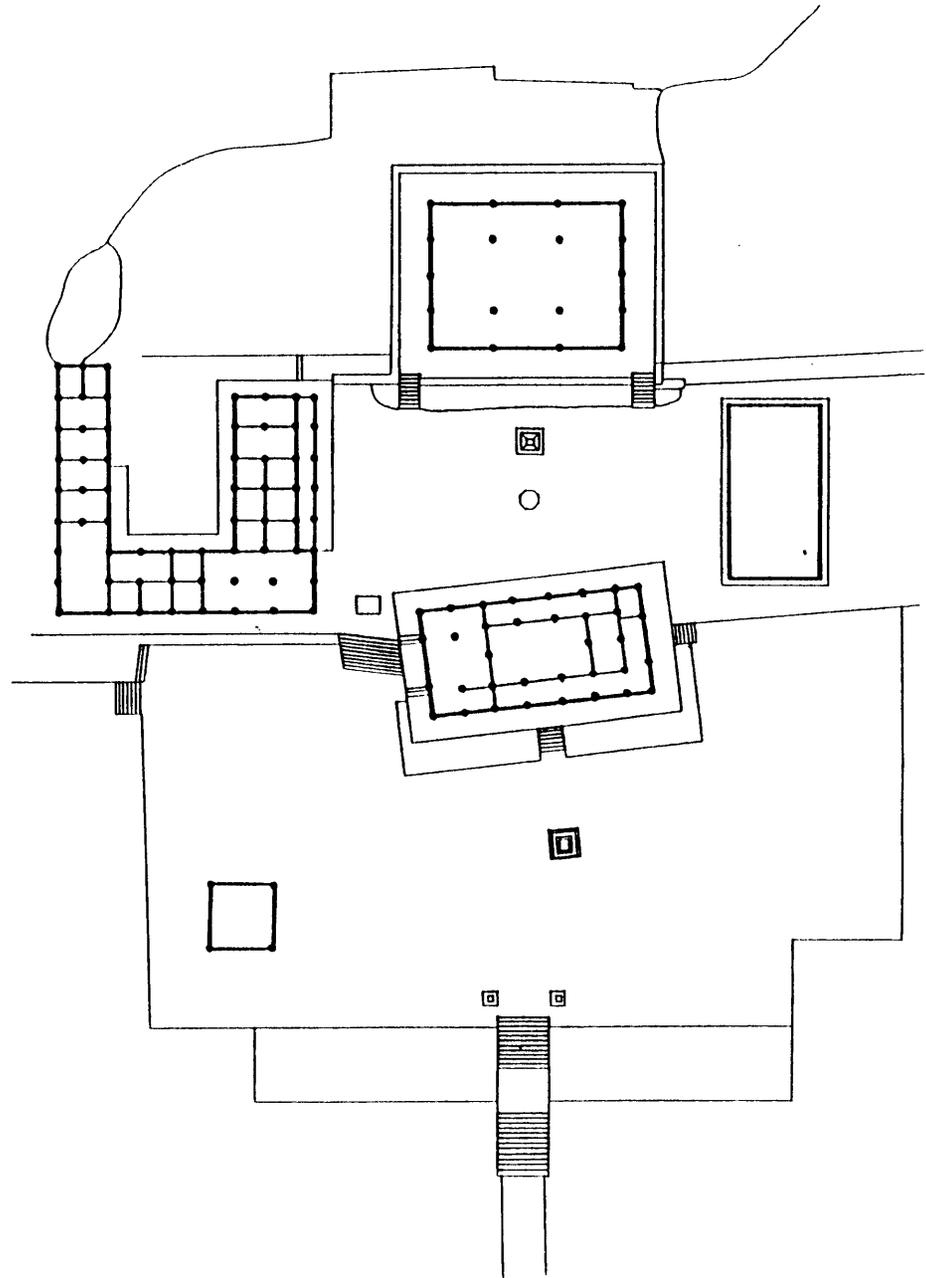
2.1 Two plans of Sooduk Temple.

Nobody knows for certain when Sooduk Temple was first founded and when the present state was achieved. According to legend, a famous Buddhist priest built this temple when there were three separate countries in the Korean peninsula: Bakje, Silla, and Kokuryo. From the recent renovation, we know that the main building was built in 1308, so that the temple must be more than a thousand years old.

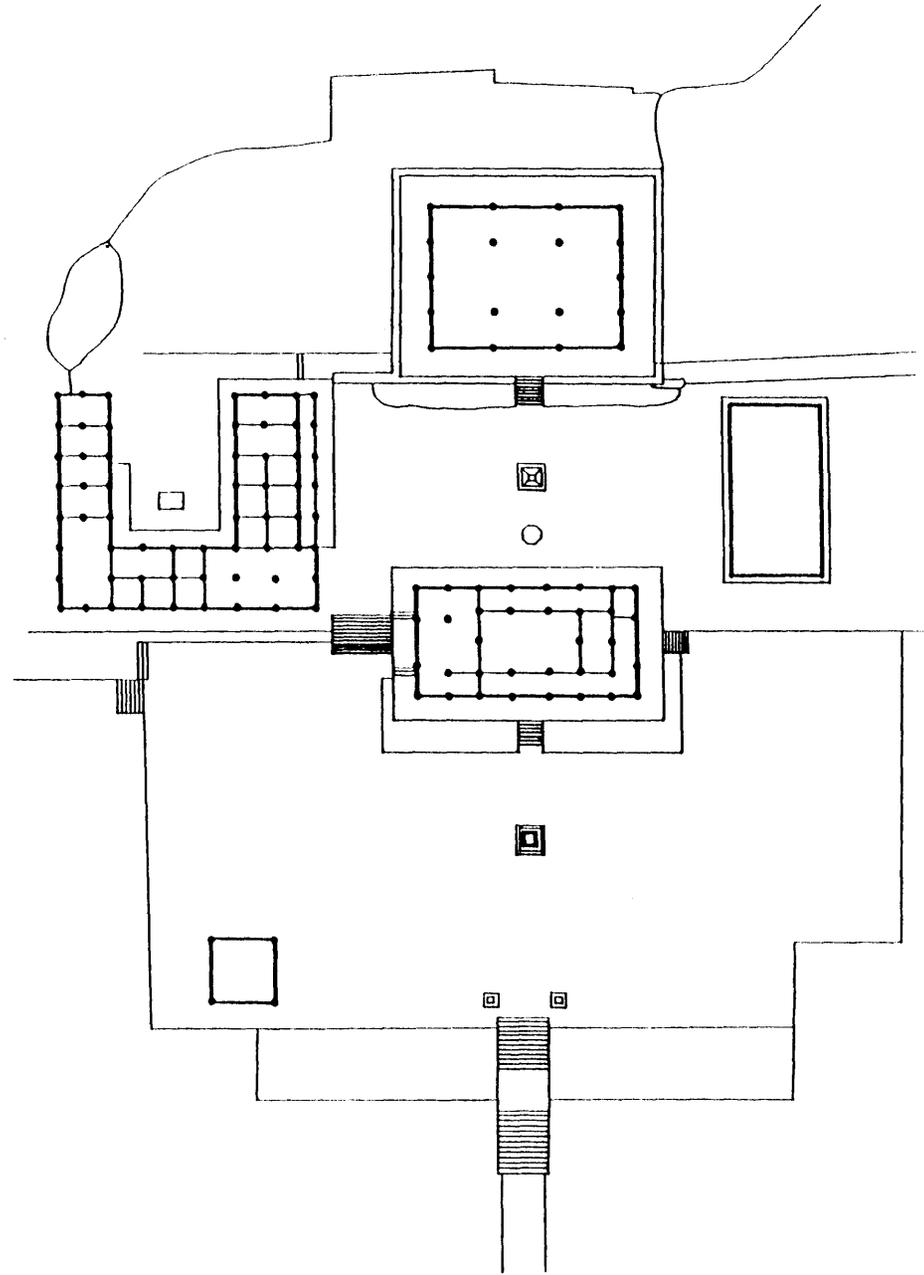
Historians regret the disadvantage of not being able to see the initial stage of Korean temples because of the fragility of the wooden structure, the major component of Korean architecture. However, we sometimes experience a misfortune turning into a blessing--as in the case of Sooduk Temple.

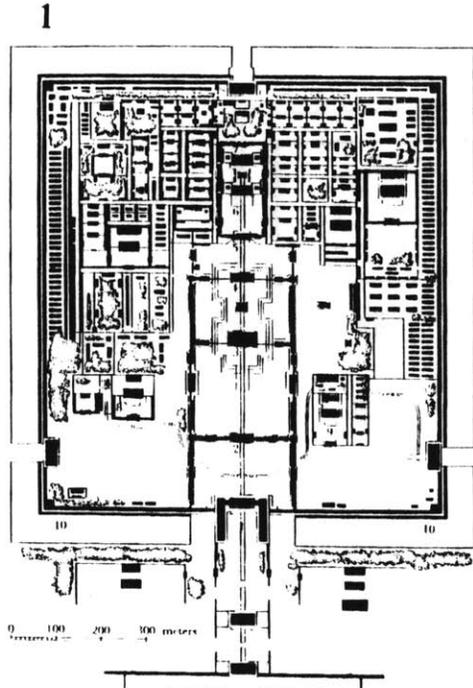
I present here two different plans for Sooduk Temple based on the assumption that throughout a millenium, the temple was burned down several times and was on each occasion rebuilt with considerable and conscientiously applied improvements by the monk and architect. The first represents a plan of five years ago before the most recent alteration. The second plan is an speculative

Plan 1: Sooduk Temple
Actual Plan of five years
ago



Plan 2: Sooduk Temple
Speculative Plan (Supposed
plan of a millenium ago)





plan of my own. At first glance, these two plans might look similar. Both have four similarly sized and shaped buildings surrounding an inner court . Yet, a closer look reveals several differences. Please test your powers of observation and patience. When eight differences are found, the game is over.

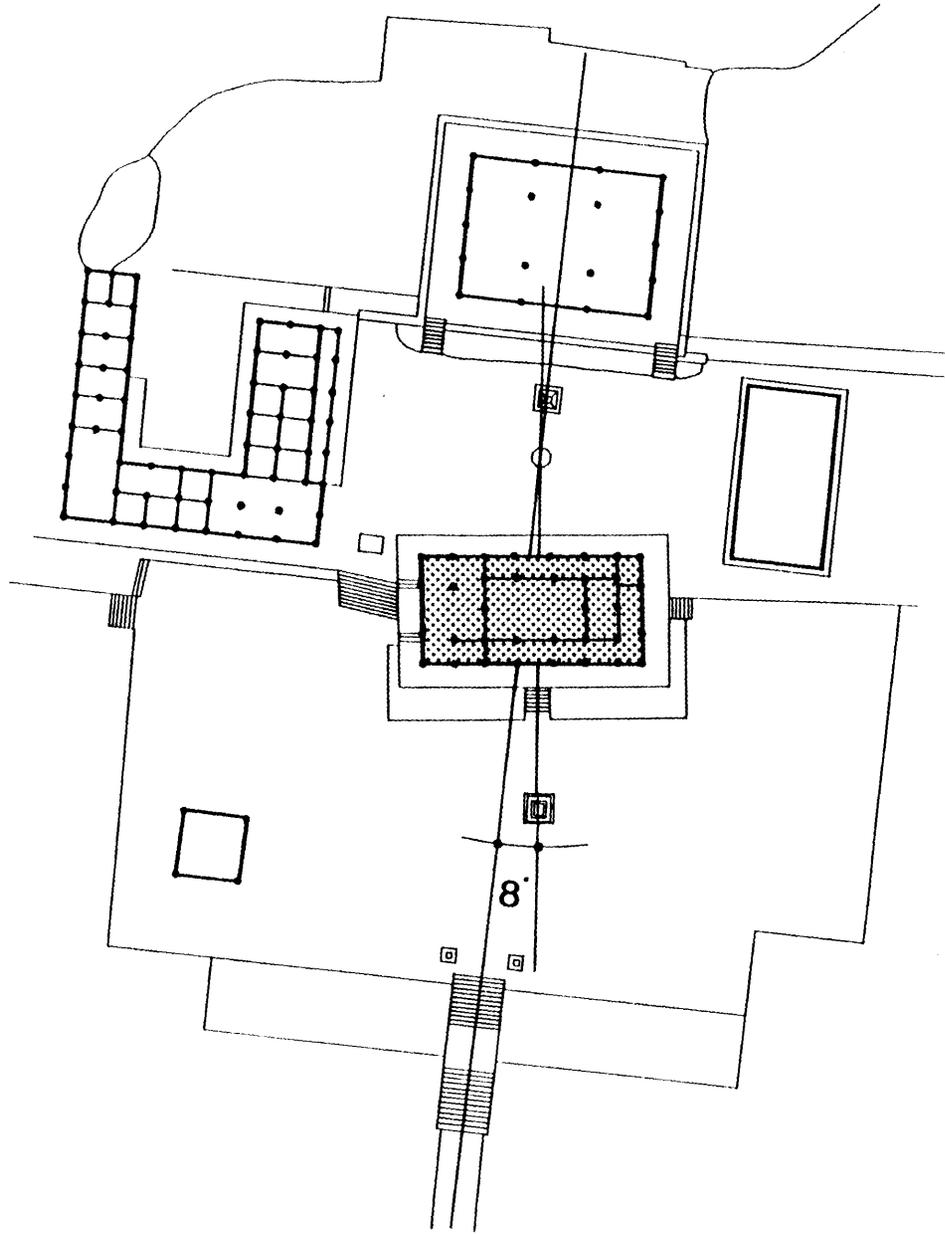
In the history of Korean architecture, I believe a very critical change of mental state has occurred in the minds of Korean people. The two plans suggested here illustrate the respectively different mentalities.

2.2 Angled Contemplation Building

The most obvious difference is in the contemplation building, which turns with respect to the main axis. In the very few instances of deviations from axis in Korean architecture, the angled buildings usually occur away from the main axis.

The tradition of maintaining one distinctive axis in Korean temples is said to have come from palatial architecture, which had adopted the one-axis system from China much earlier. In ancient times, temples were built by the dominating class who naturally imposed the one-axis system. As if bound by a canonical force, all the buildings of a temple complex yielded to the main axis. Given this stringency, the angling off axis of a building represents a revolutionary event.

2

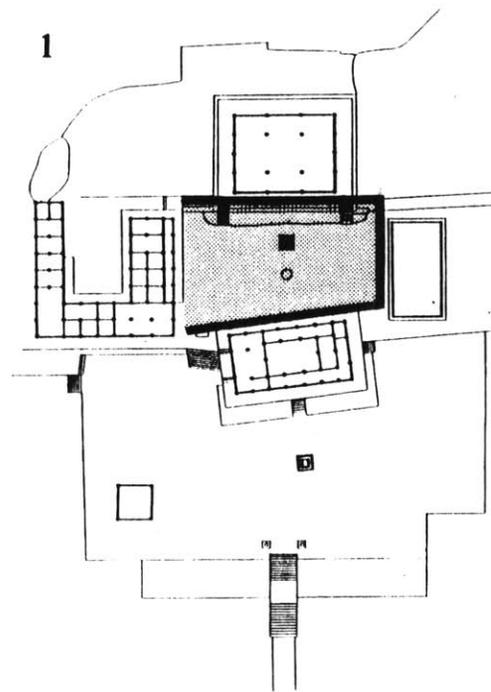


1. Plan of the Forbidden City, Peiking.

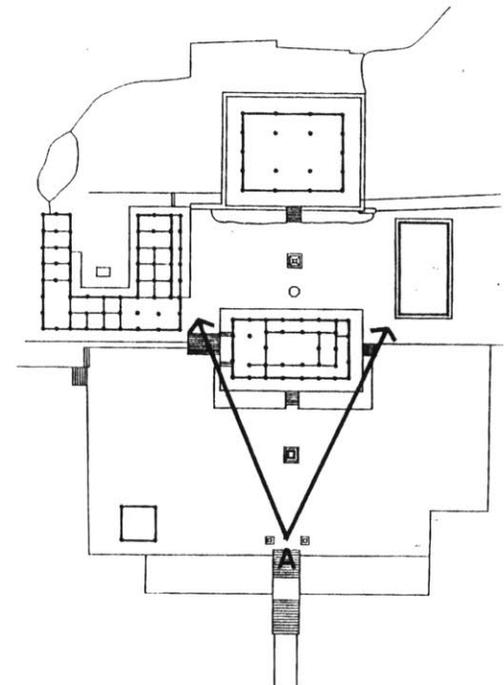
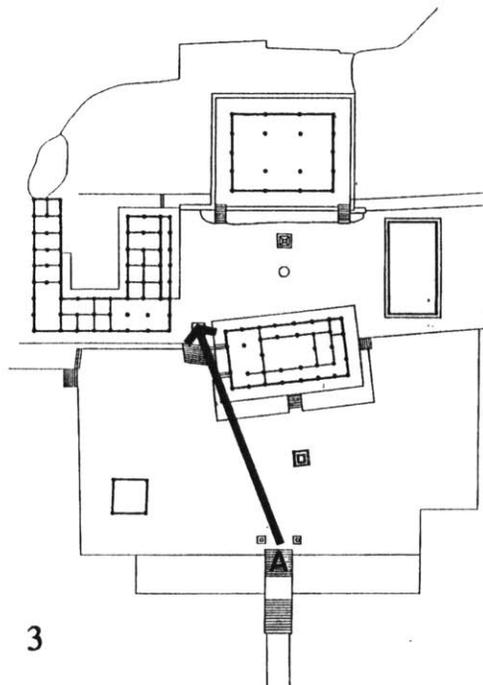
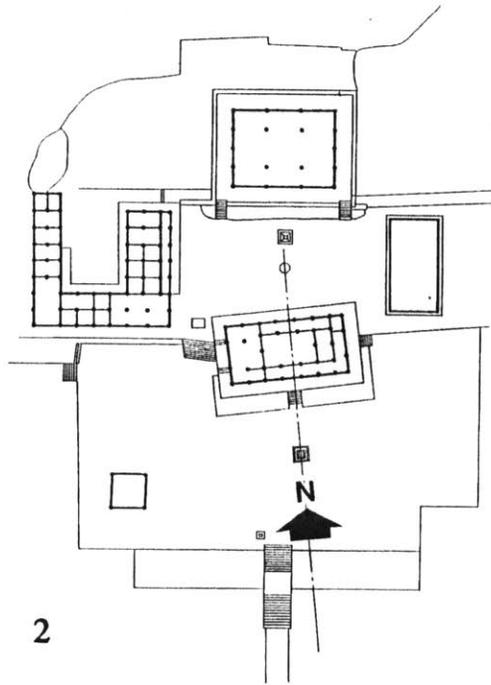
2. Angled Contemplation Building, Sooduk Temple.

In regard to Sooduk Temple, three plausible explanations for the angled building arise. First, the trapezoidal shape of the inner court recalls Michelangelo's use of turned buildings in the Campidoglio to produce dynamic visual perspectives. Secondly, we can relate the turned angle to the true North-South axis. Yet, the most persuasive explanation is that the architect turned the angle of this building to invite the visitor's approach to the main space.

Visiting this temple myself was a marvelous experience. At the end of the long staircase, we see the contemplation building almost suddenly and, at this moment, we are compelled to choose one side of the building for passage beyond. What surprised me was that nobody hesitates to move to the left side of the building as if the slightly turned angle of the contemplation building exerted a mysterious power.

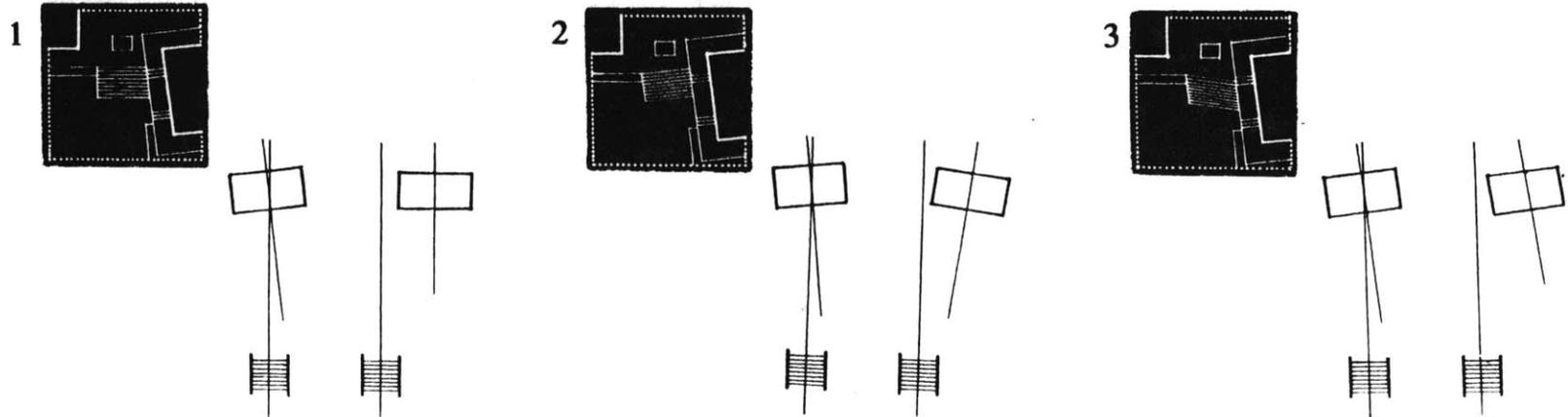


1. Trapezoidal space reminding us of the use of angled buildings by Michelangelo in Campidoglio.
2. Right southern direction and axis of the contemplation building
3. Fortified left side approach by angled contemplation building



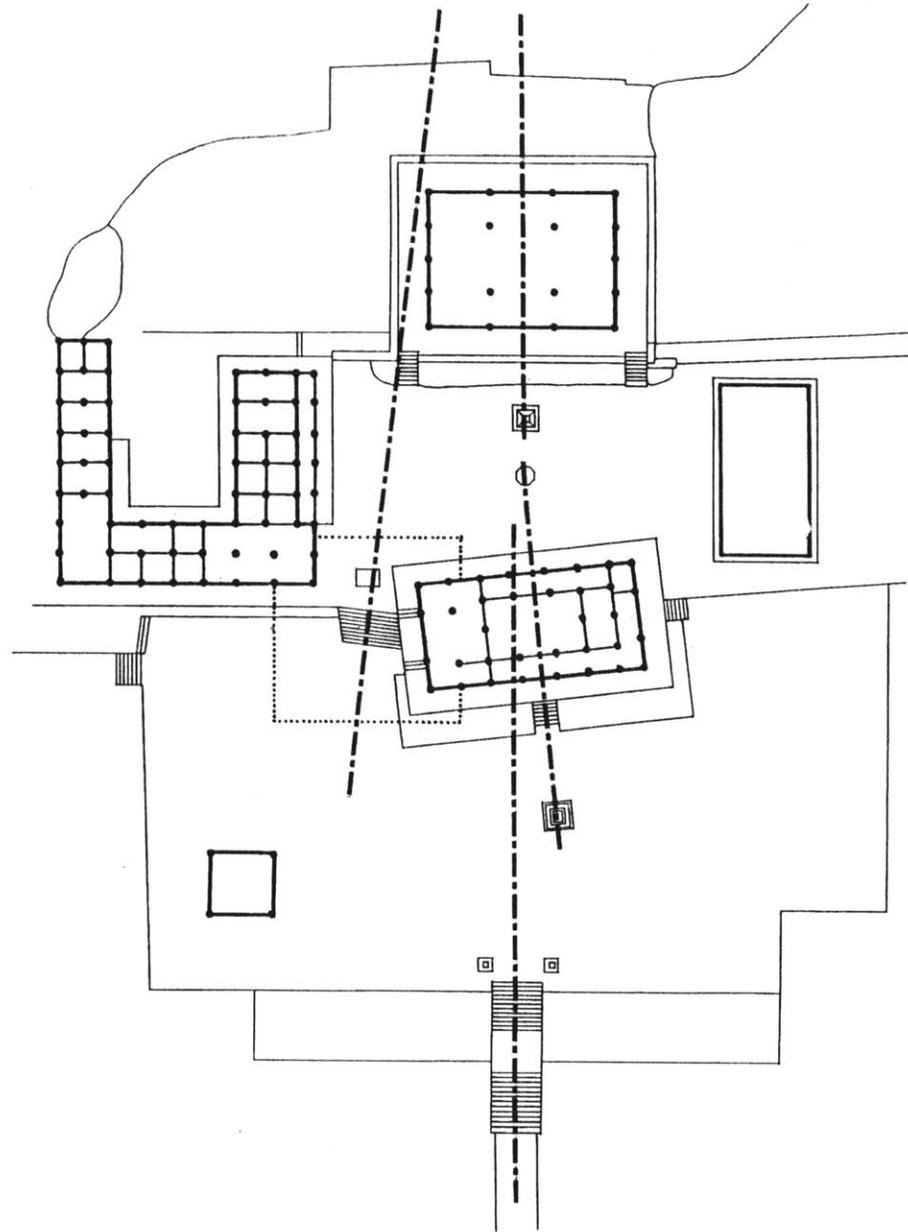
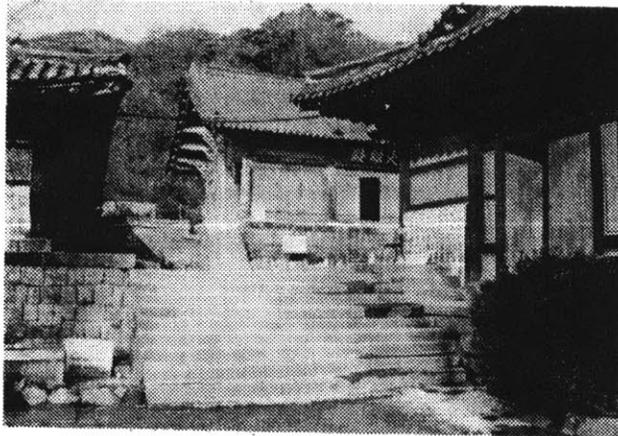
2.3 Angled Stairway

More delicate consideration seems to have been given to the stairway to the left of the contemplation building. The turned angle of this staircase looks very arbitrary at first. But my conviction that every critical decision was made very self-consciously drove me to investigate the angular relationship of this staircase with each building. First, if the angle of the main axis were preserved in the stairway, we might approach the main building head-on. Second, if the turned angle of the contemplation building were kept in the stairway, the main building might be seen with an eight degree clockwise rotation (of the head). But the present condition of the staircase makes us see the main building with an eight degree counterclockwise rotation--the same experience as when we first encounter the contemplation building! The architect must have turned the angle of the stairway to echo the earlier experience just as we enter the main space.



1. If the angle of the main axis were preserved in the stairway,
2. If the turned angle of the contemplation building were kept in the stairway,
3. The present condition
4. Picture showing the turned staircase

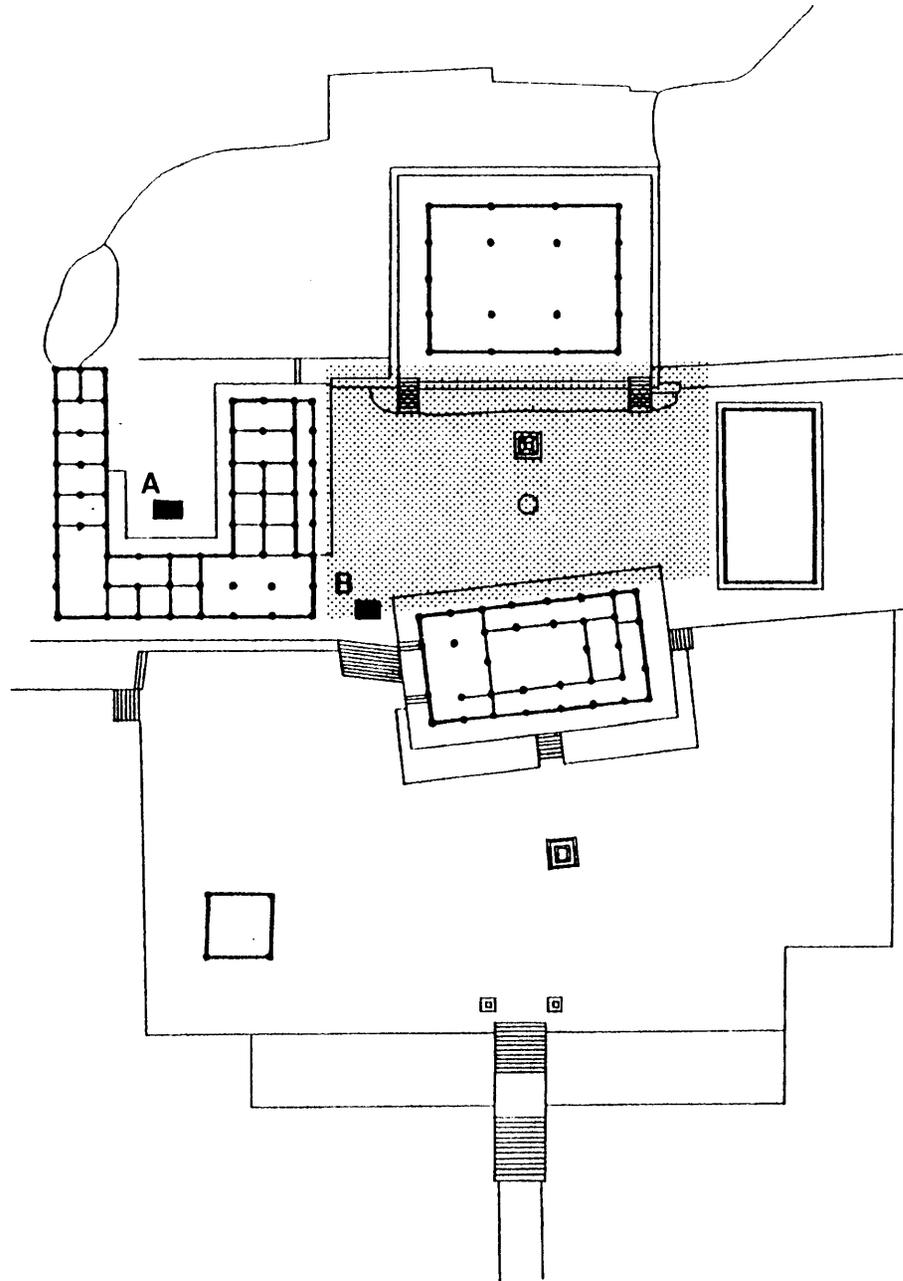
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2.4 Bizzare Location of Well.

In the SooDuk temple, the architect and priest staged very careful psychological effects for visitors. The angled contemplation building and stairway on the way to the main building help to create an illusion of repeating visual experiences. But the most complicated and delicate consideration was given to the location of a well.

The well in SooDuk Temple used to lie, strangely enough, directly in the main path from the staircase to the inner court.--an explicit obstacle to the visitor's movement. I could not realize the sophisticated intentions of the architect until visiting the temple myself. Unfortunately, the modern priests, out of ordinary common sense, moved this well down to the left side of the staircase a few years ago. Even though the well no longer exists on the same spot, I consciously looked down at the ground because I did expect to see the well. And with some disappointment, I raised my head. It was in this short moment that I came to fully understand the hidden meaning of the vanished well. After the short action of lowering and raising my head, I found that I belonged to a totally different world of the divinity, apart from the secular world. The short moment of staring at the well made me forget the past and prepare an audience with the Buddha.



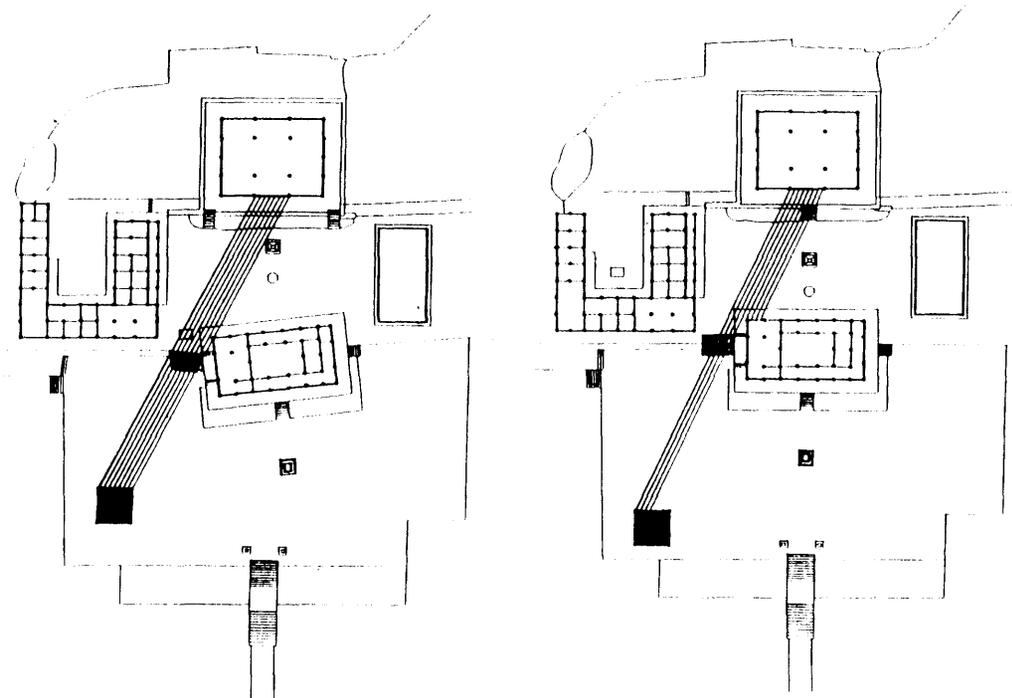
A. The most plausible location of a well: in the middle of the inner court of the residential building

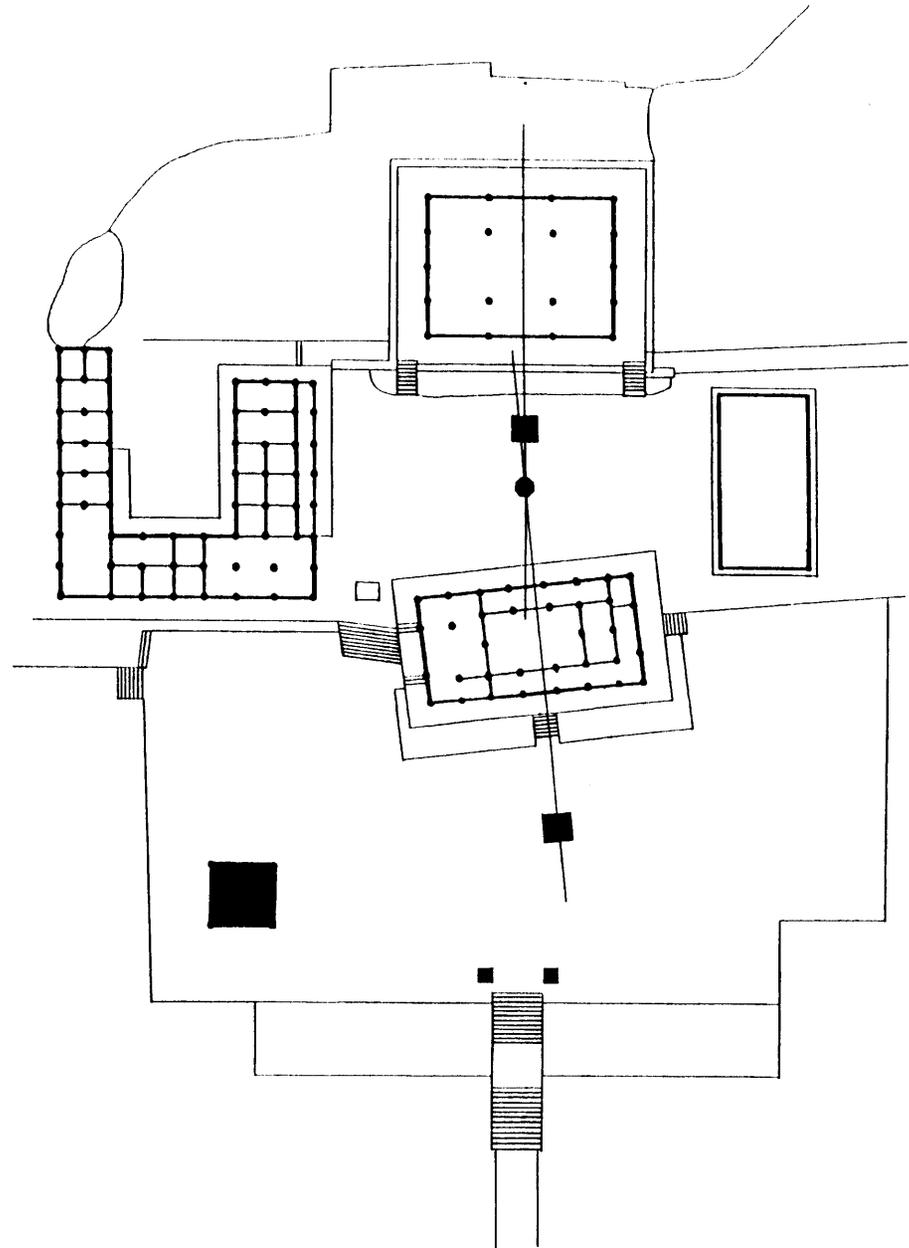
B. The actual location of the well

2.5 Space Connectors and Space Organizers.

The stone lamp is located on the intersection of the two axes. Thus, it works as a focus of the space while easing the strains of the two axes. Evidently, stone lamps and pagodas did not occur randomly in Korean architecture, like thrown dice, but helped to organize a consistent and dynamic space.

The bell tower must have been done as carefully located as the pagodas and lamps. Analysis of the plan shows that the bell tower is in the best place to be seen from the front of the main building.



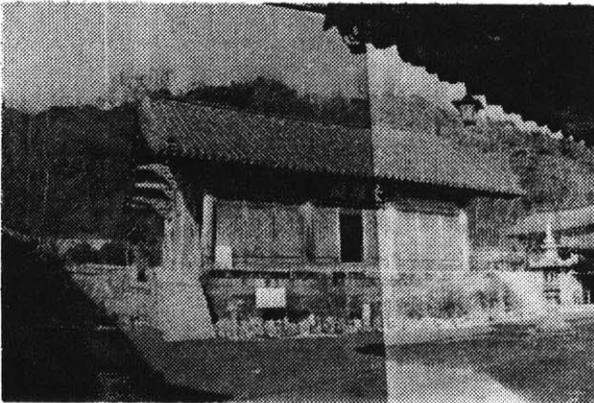


1. Interestingly, the parallel lines connecting the north side of bell tower with the middle unit of the main building pass above the angled staircase without any visual obstacles.

2. Stone lamp, pagoda, and bell tower in harmonic spatial order.

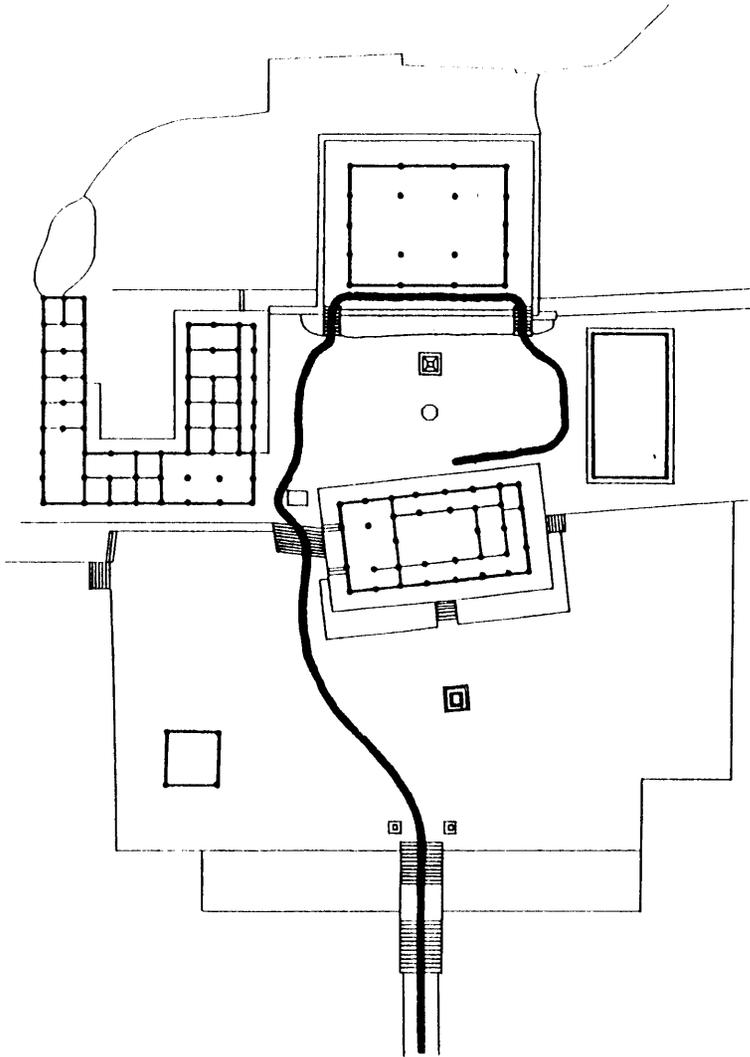
2.6 Staircase of the Main Building.

Most buildings of Korean temples have their frontal staircases in the middle of the building base as a natural result of the one-axis system. However, in SooDuk Temple, this convention was not followed. Instead, the staircase was split and shifted to each end of the building base, thereby fortifying the unique approach along the edge of the main court as effected by the angled contemplation building and stairway. How discreet the architect and priest were!

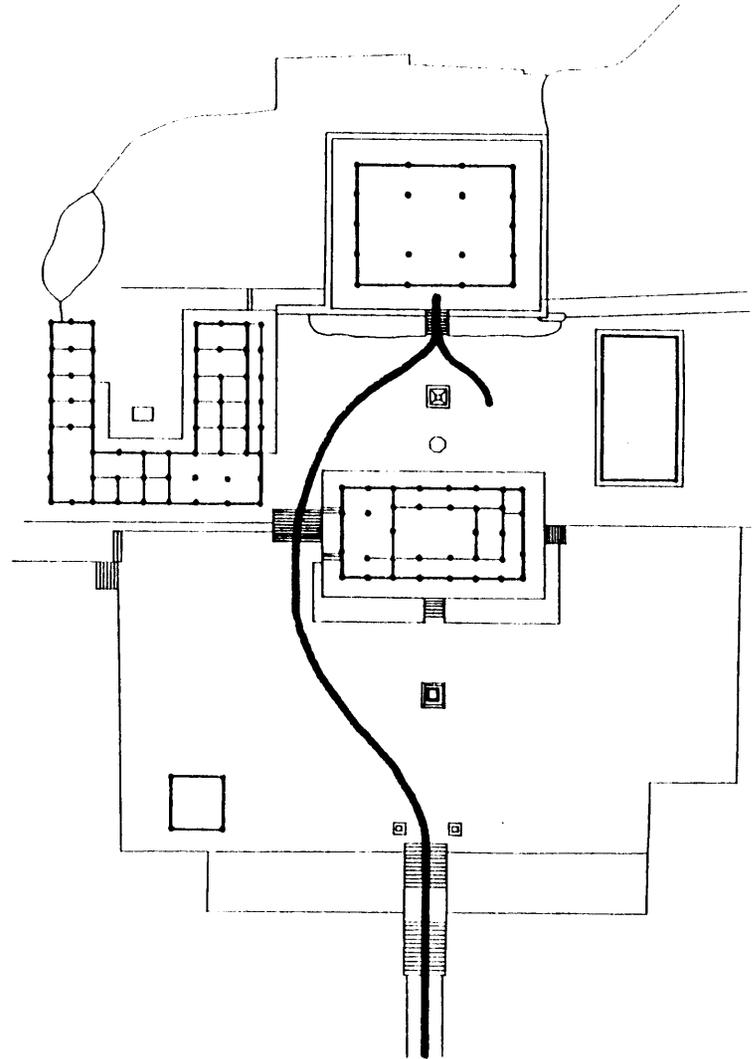


1. Along the edge of the inner court, a meaningful movement line was created with the help of the turned contemplation building and the split staircase in front of the main building. Now, the contemplation building is no longer an obstacle to be overcome.
2. The contemplation building is an obstacle on the main axis which compels visitors to detour uselessly

1



2

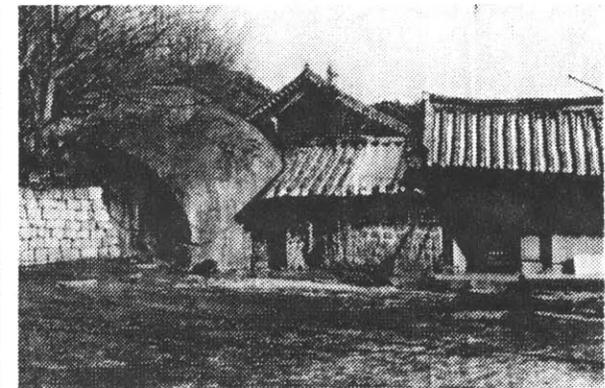
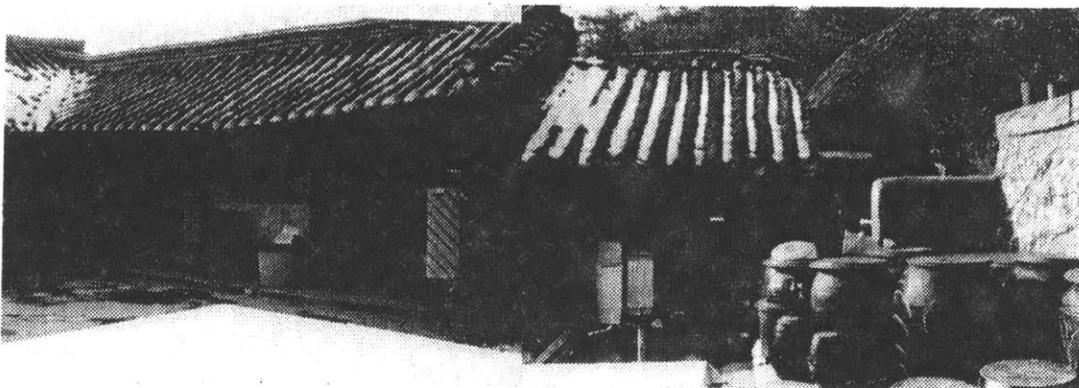


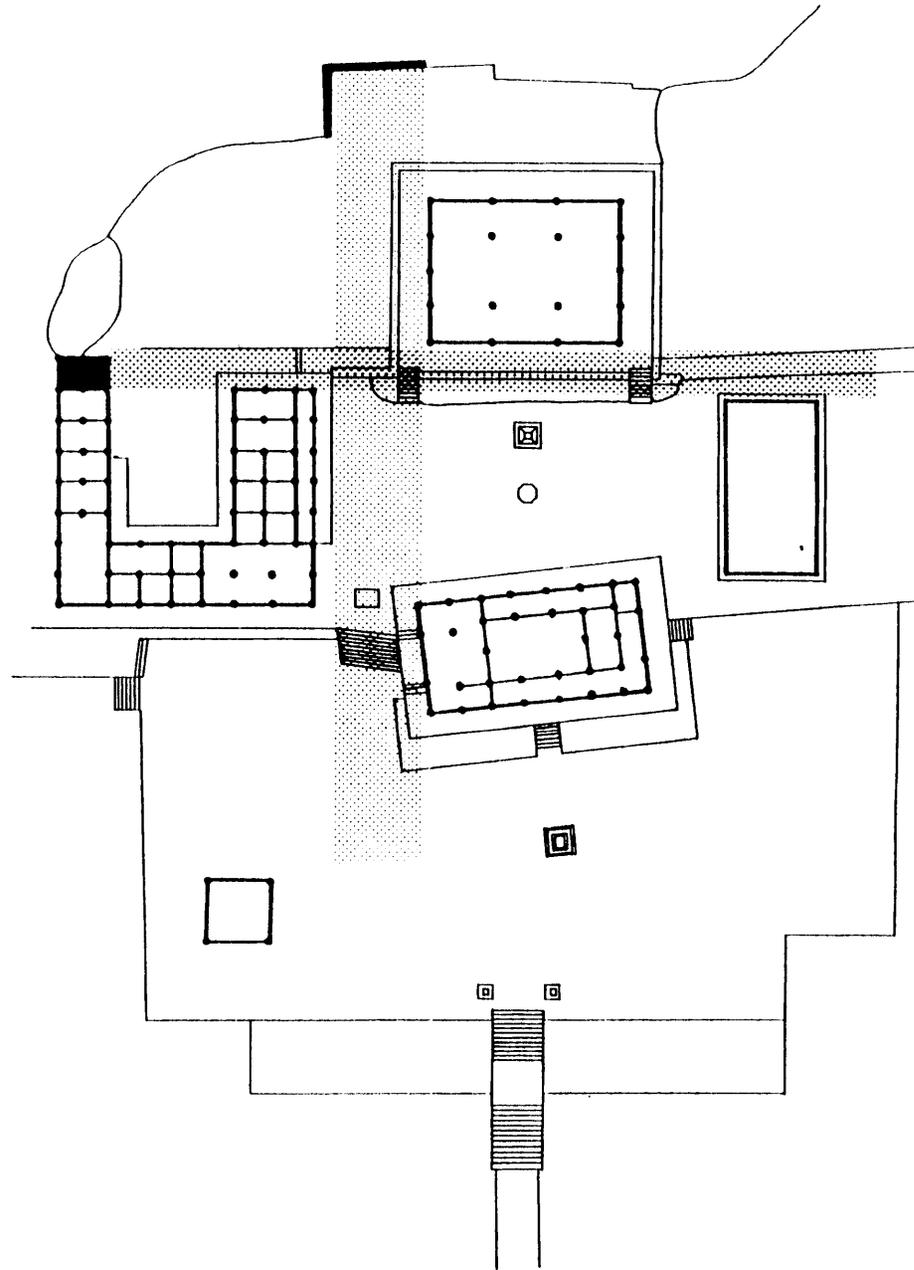
2.7 Extension of a building or Extension of a mentality?

The extended part of the west building attracted my special attention from first glance at the plan because this addition ultimately broke the formal shape of the building. I discovered during my visit that the extruded part was attached after the formal C shape had been achieved. Its lower roof and separate structure make it a rare example of discontinuity in an early Korean temple.

What was the motive for adding to the already existing building at the cost of abandoning the building's formal shape? Was it to define a territory more clearly or to create a outlook from the extruded part?

The extruded part might be easily forgotten in light of the whole spatial organization. However, this small change is believed to be a significant indication of a more advanced architecture. When observing the evolution of Korean temples in terms of Jane Darke's theories, the importance of SooDuk Temple becomes highlighted.





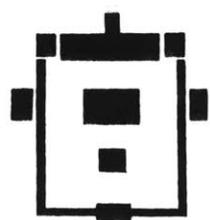
1. Picture showing the attached part of residential building.

2. Defined territory.

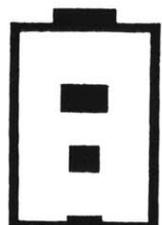
III. KOREAN TEMPLES

3.1 Jane Darke's Prime Generator

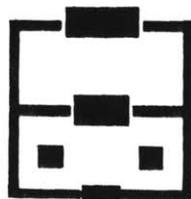
Darke proposed an alternative to the classic analysis-synthesis theory of the design process by which the designer starts with a systematic listing of all constraints. Through observation of the actual design process, Darke demonstrated that very early on, the design imposes or evolves a particular generating concept or limited set of objectives. These objectives form a starting point for the architect, a way into the problem. This primary generator helps the designer to make a creative leap across the rationality gap between the problem information and a solution concept, ultimately reducing the variety of the potential solutions to a small class of solutions that is cognitively manageable. Then the solution class is further narrowed down by the proposal of one particular solution concept, which is then tested against the requirements and constraints of the problem.



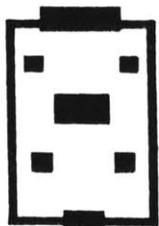
禅定里



空旗寺



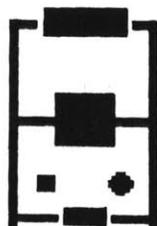
感德寺



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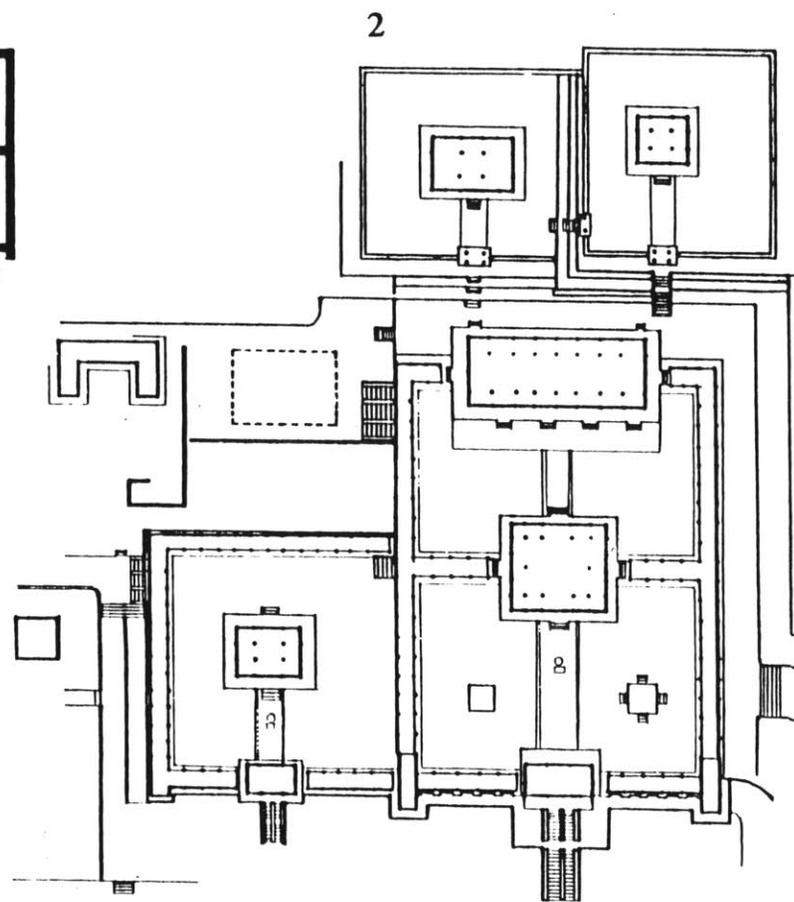


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佛国寺

3



2

0 10 20 30m

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Composition type	System of pagoda	Number of main hall	Number of cluster	System of axis
Temple of Amitabha	None	2	2	Juxtaposed
Temple of Maitreya	Single	2	1	Intersecting (about 90)
Temple of Avatamsaka	Single	2	Multi	Unique and central
Temple of Lotus	Twin	2	2	Juxtaposed
Temple of Uni Buddhism	None	1	1	Unique and central

1. Five types of Korean temples classified by Buddhist dogmas.
2. Amitabha temple: Bulkuk temple. This temple was founded in 528 and extended to have the present condition in 751
3. Early Korean temples which were which were direct transformation of Buddhist dogmas into

3.2 Prime Generator and Development of Korean Temples.

With this notion of prime generator as a starting point of design, the early Korean temples can be interpreted very diagrammatically. All the early temples were built upon religious dogma as prime generators of architecture. One Korean historian, Bong Ryel Kim, has revealed how the Buddhist dogma and worship system influenced temple structure. He categorized the composition of Korean temples into five general types according to the respective system of worship and demonstrated that each type developed a unique spatial organization. Each temple was very direct transformation of Buddhist dogma into architectural space.

The temples of Amitabha feature two clusters with two main halls to accommodate the dual worship of Amitabha and Shakyamuni. Besides the main cluster, an additional cluster was needed to worship the Amitabha, who is supposed to live in the Western Paradise of the Buddhist Elysium. Thus, the western cluster represents the world of Amitabha while the main eastern cluster represents Shakyamuni's world of Sabha.

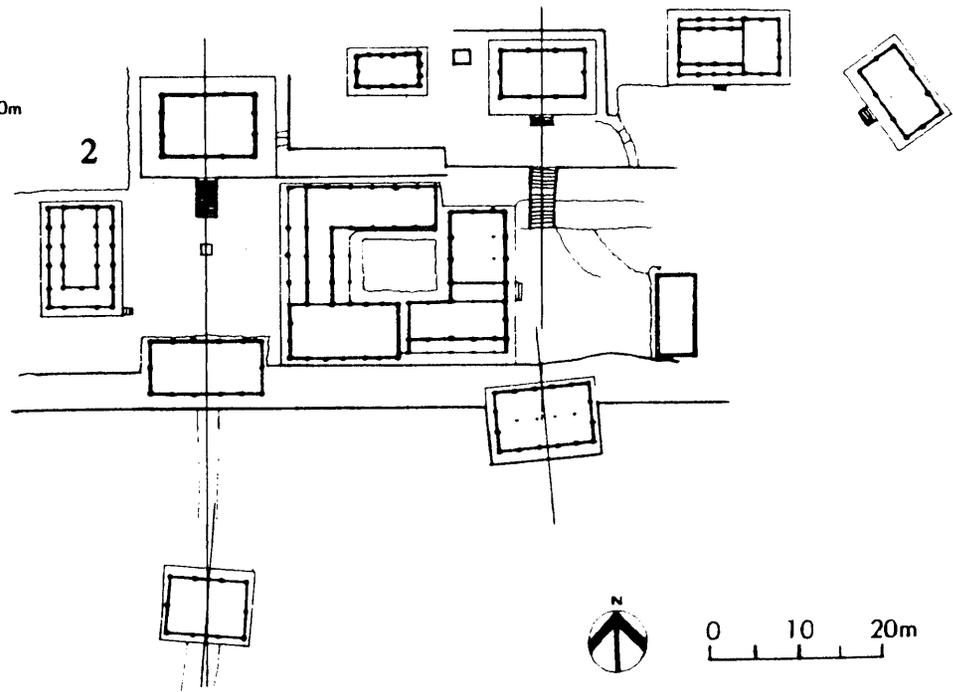
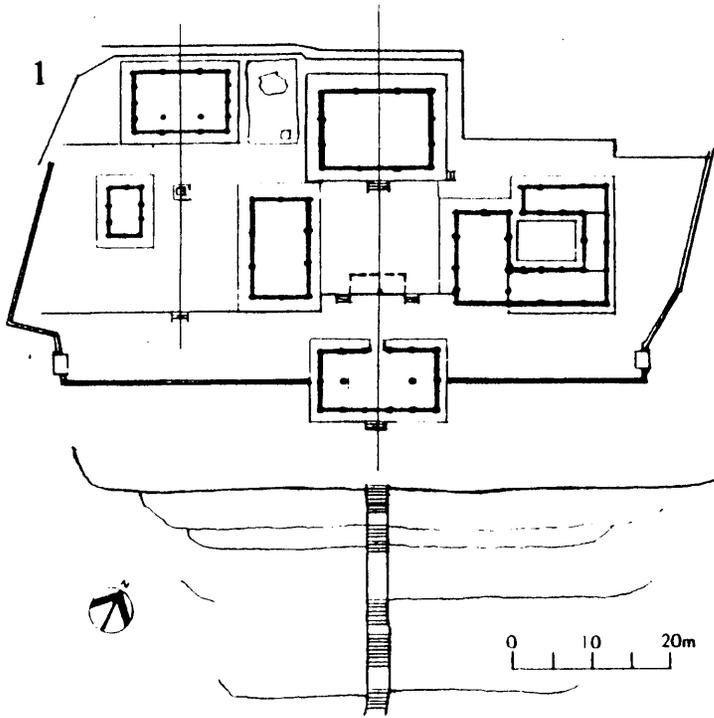
The architects of Amitabha temples faced the important task of relating the two spaces in a harmonic order while preserving each's independence and character. One of the oldest and largest Amitabha temples is Bulkuk Temple. In this Amitabha temple, the designer chose to follow the Buddhist dogma very faithfully. First, he juxtaposed two linear axes. Then, he built two well-

contained clusters to signify the different respective worlds of Amitabha and Shakyamuni. Even the number of stone steps and building bases reflect Buddhist dogma. As a result, everything is in geometrical harmony and order.

Amitabha temples continue to be built all around the country. Four centuries later, the Buddhist dogma of Amitabha temple were reinterpreted in a slightly but significantly different manner. A temple named Bongjung has two juxtaposed axes as with Bulkuk Temple, and the world of Amitabha lies on the left (west) side of main cluster. But, though organized by similar principles, the space is no longer the captive of an obsession toward perfection.

Another Amitabha temple built in 15th century shows that the temple space is no longer a mere translation of Buddhist doctrine. In Yongmun Temple, space enters the realm of architecture as not a by-product of an abstract geometrical solid but as an experiential consideration. As we saw in Sooduk Temple, some buildings are in angled positions, and the main spaces are defined loosely by the surrounding buildings in relation to the landscape.

1. Amitabha Temple: Bongjung Temple, 12C.
2. Amitabha Temple: Yongmun Temple, 15 C.

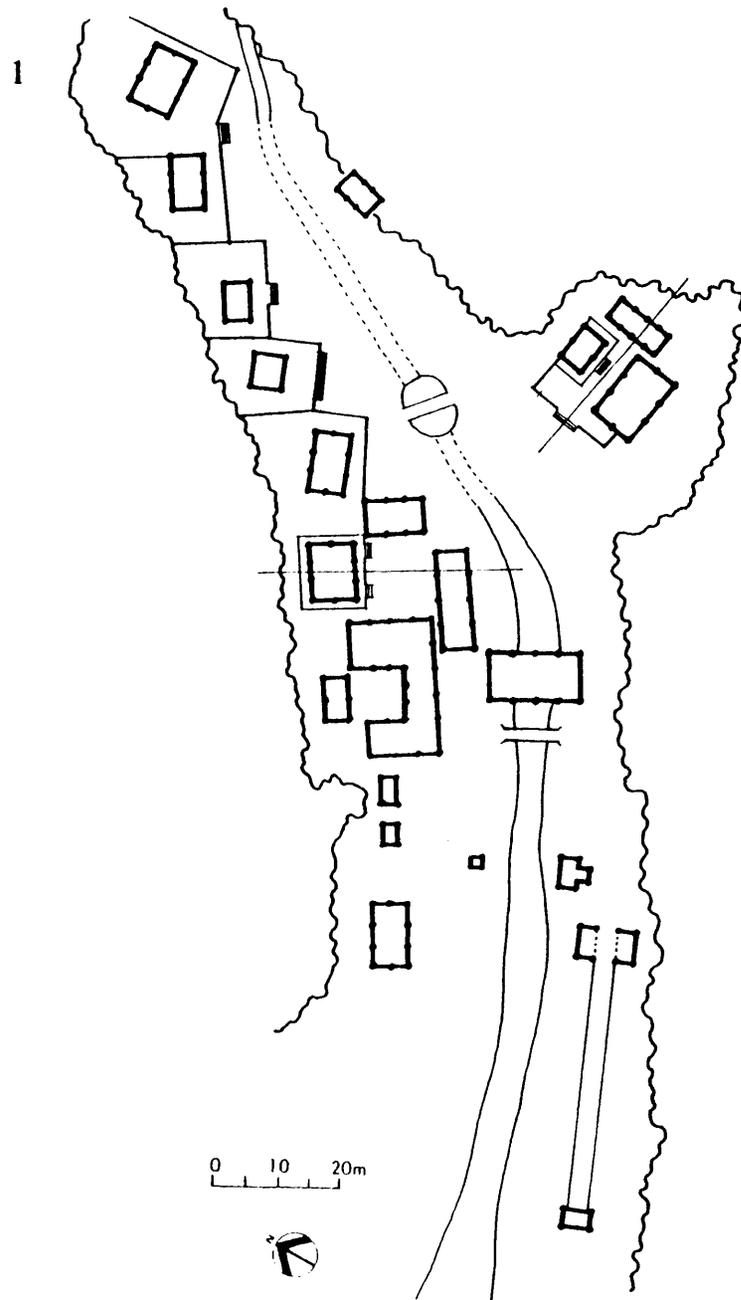


Later temples continue the evolution of a more dynamic and organic architecture. In Koeun Temple, the Amitabha and Shakyamuni spaces have become separated by a stream. Though the western positioning of Amitabha's space is still strictly observed, the general layout of the whole site departs from its precedents. The designer resolutely abandoned the old way of juxtaposing axes, and instead, along two unparallel axes, geared each building toward human experience.

Other categories of temples have also developed unique site organizations by emphasizing human experience, though they have started from different spatial structures. The temples of Maitrya were built upon intersecting axes, one of which represented Maitreya, the messiah of the world. The temples of Avatamska realized a centrality corresponding to a concentrically organized world view. Ultimately, temples of uni-Buddhism during the Chosun dynasty came to accommodate all the characteristics of the antecedent temples.

1. Amitabha Temple: Koen temple.

What did the architect, who designed this temple, have in his mind?



3.3 Violating Perfection.

With each temple system, the most evident change over time is from early formality to a more disordered, later state. At first, a canonical system is derived from respective Buddhist doctrines. Then, the whole space system is transformed in several ways: the axes are split and moved, or a non-parallel axis is added. The definition of territory varies from tight to loose. Each building begins to have its own angle against the main axis. etc.. This series of changes breaks the perfect form into pieces

In a sense, Takefumi Aida's Block Houses might bear similarities with Korean temples in their development. In Block House VIII, Aida began with two prototypical forms--a cube and a cylinder--and, in a series of repetitions, took apart the pieces, sometimes destroying them. These successive manipulations remind us of that process of dissolving the very formal early temples into more informal and spatial temples occurred only gradually.

Toy Block House VIII

1 9 8 4

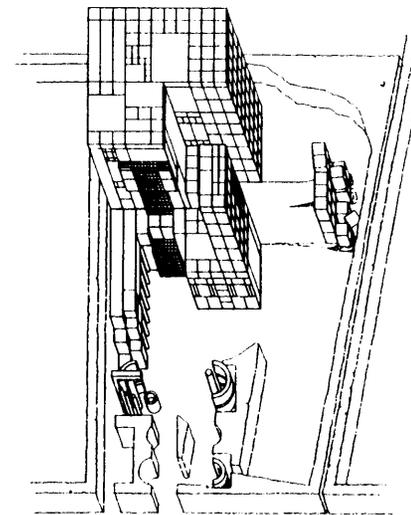
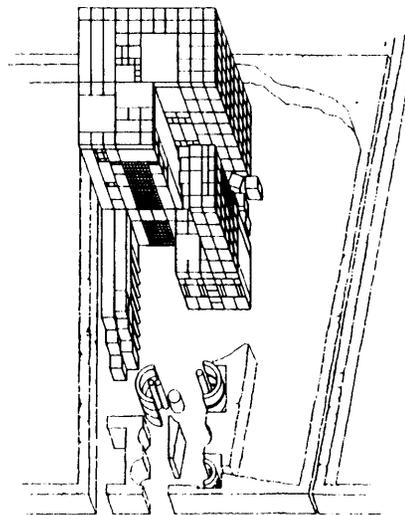
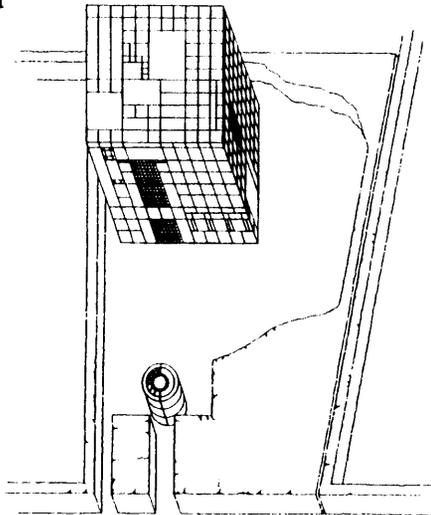
Tou block house VIII began with two prototypical forms: a cube and a cylinder. These two forms are each composed of interlocking pieces; space is created by gradually taking apart these pieces and in certain cases destroying them. By repeated trial and error, the process of space composition is reconciled with the process by which the toy blocks are destroyed.

2

Aida's experiments carry two significant meanings. First, though the result of the final building bears little resemblance to the original cube and a cylinder, it does not signify merely a mixture of broken pieces spread around the site. Namely, each simple action of breaking down and moving a part involves a special contemplations. Thus, the final state must be understood in spatial terms.

1. Toy block house, Takefumi Aida, 1984, Stage 1 2 3.
2. Description by Aida.

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Second, we need a framework for thinking that accelerates the design process-- just as Aida used the process of dissolving prototypical forms. Space is an intangible void. Thus, it is essential to rely on mass or visible material first. Aida's project shows this inevitable dependency of space. However, it is not always true that space cannot exist without the help of materiality.

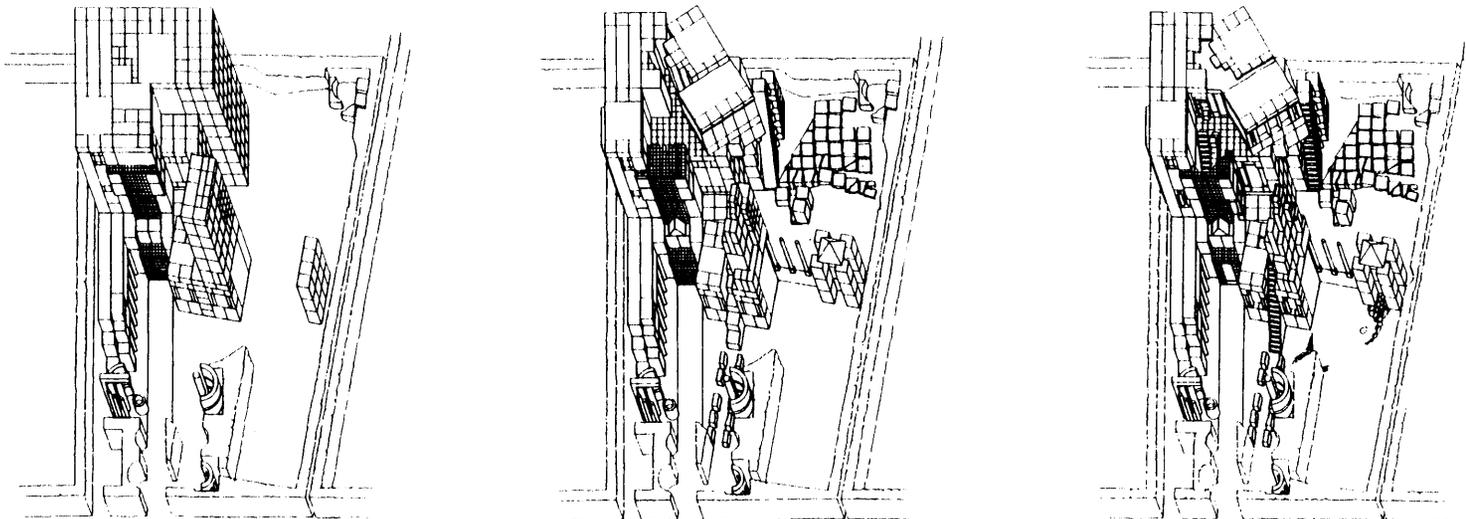
Men have the ability to think of the abstract as the concrete, so that positive space can be considered as negative space. Aida's frame of thinking seems to rely heavily on a play of mass. But, by repeated trial and error, he tried to achieve a kind of "space map" in his mind.

Just as with Aida's Toy Block Houses, Korean temples have developed by repeated trial and error through hundreds of years. Korean temples seemed to emphasize a play of mass, as well, by breaking and deploying parts. And as each decision for the Block House led incrementally to the creation of an ideal "space map," so, too, did Korean Temples evolve their own spatial structures case by case.

When a new building was added or an old building reconstructed, the space map was developed incrementally--as we saw in the case of Sooduk Temple. Or, sometimes, all the knowledge accumulated from history was deployed in a new temple.

1. Toy block house, Takefumi Aida, 1984, Stage 4 5 6.

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IV. SPACE ANALYSIS.

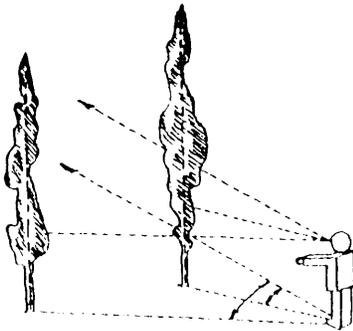
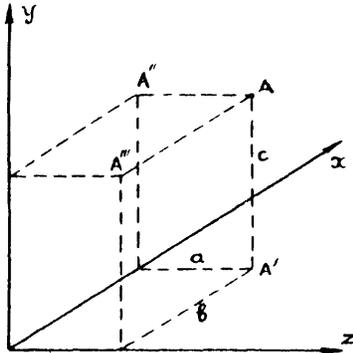
4.1 C. A. Doxiadis and polar system of coordinates

Architectural space as conceived does not trace easily to “spatial thinking,” the meaning of which is not even clear to me. To tell the truth, most architects choose to limit themselves to a particular idea or private method for creating an architectural space rather than strive for the pure essence of the space itself. Aida’s approach shows us his private way of forming space and, in fact, many architects probably conceptualize space in similar ways subconsciously.

What arouses my interest in Aida’s project is that as each step builds the progression toward his idealized spatial structure. Ultimately, his design becomes a crystallization of accumulated knowledge and thought. Similarly, Korean temples read as architectural texts of lessons learned.

In the 20th century, the greatest achievements in analyzing ancient space must be through C. A. Doxiadis’s unique study of Greek temples. Doxiadis enlarged our understanding of both ancient and modern architecture by moving beyond the rigid conceptions of a rectangular coordinate system to the more human-oriented revelations of a polar coordinate system.

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He sought to demystify ancient Greek site planning by examining ancient excavations. Through polar coordinates, he discovered a ten-part system and twelve-part system that he could apply very consistently to a majority of seemingly chaotic Greek temples. But what if the systematic rules had not been based on parts of ten or twelve? Could Doxiadis have reached the same kind of conclusion, or would his achievements need reevaluation?

It seems that the discovery of an 'irregular' basis such as 11, 15 or 17, or the discovery of a system distinguished only by a polar-coordinate basis would have weakened Doxiadis's argument emphasizing the importance of the polar system in ancient Greek architecture.

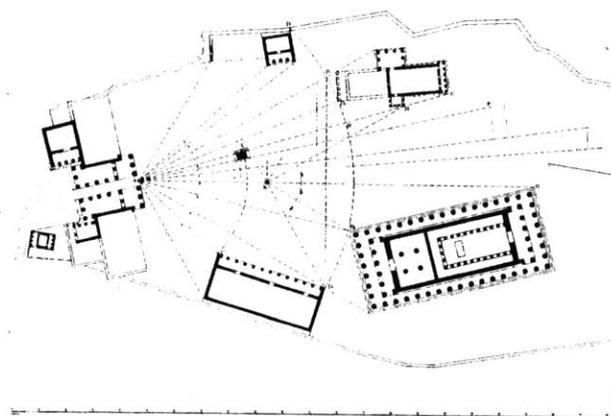
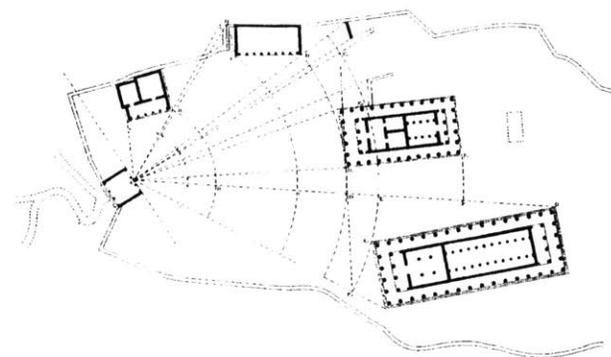
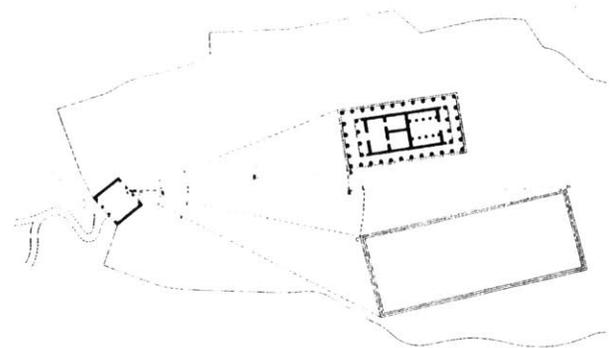
I believe that the ten- or twelve-part system per se is not as important as the more fundamental discovery of the use of the polar-coordinate system. As Doxiadis argues, the numbers ten and twelve had very special value in ancient Greek philosophy and mathematics. Thus, the ten- and twelve-part systems were merely expressions of a special interest in the two numbers. What should be appreciated in modern times is the use of the polar system in forming space.

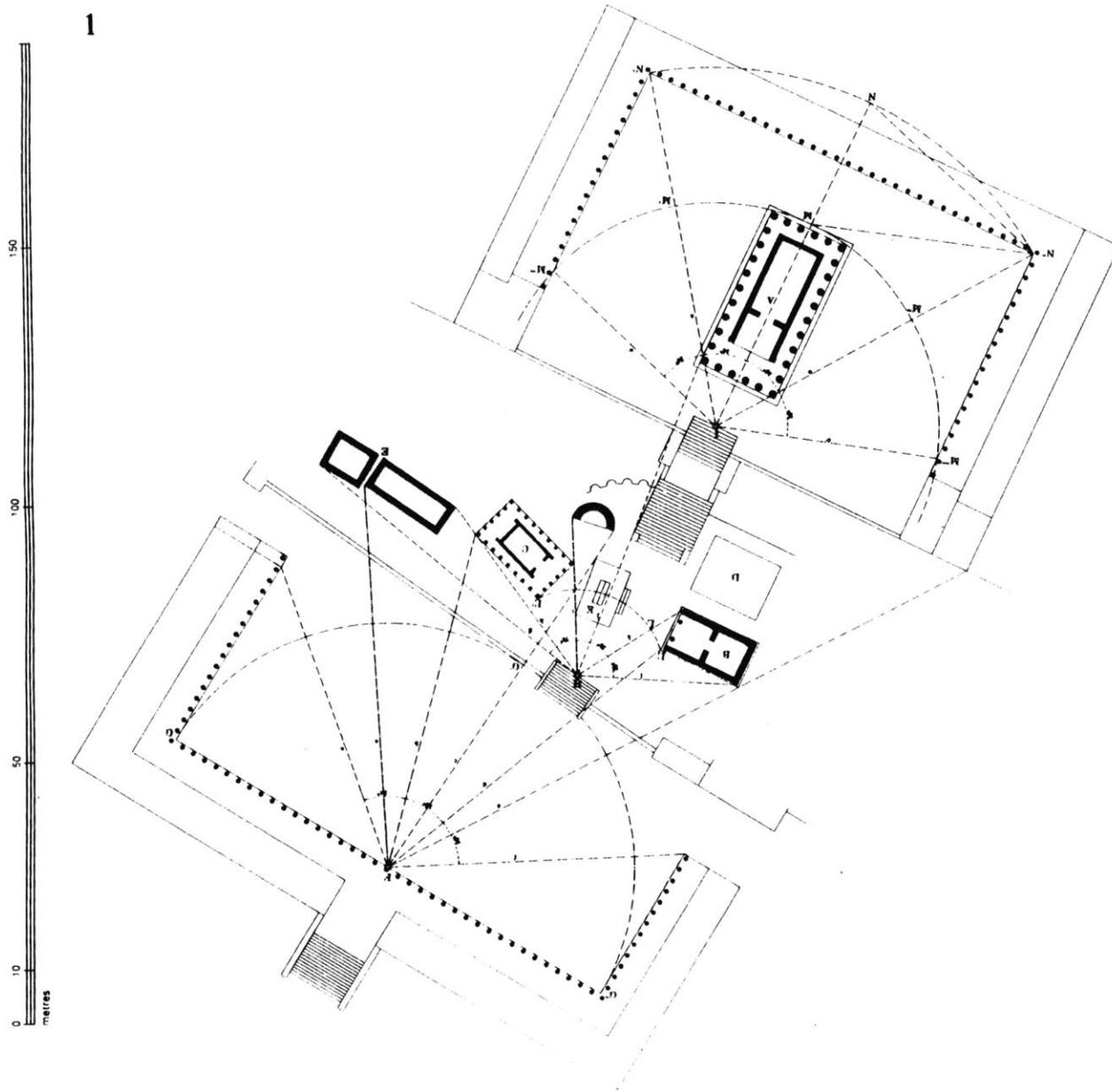
1. Rectangular system of coordinates vs. Polar system of coordinates.

2 Use of ten part system and twelve part system

- a. Athens, Acropolis I, circa 530 B.C.
- b. Athens, Acropolis I, circa 480 B.C.
- c. Athens, Acropolis I, circa 450 B.C.

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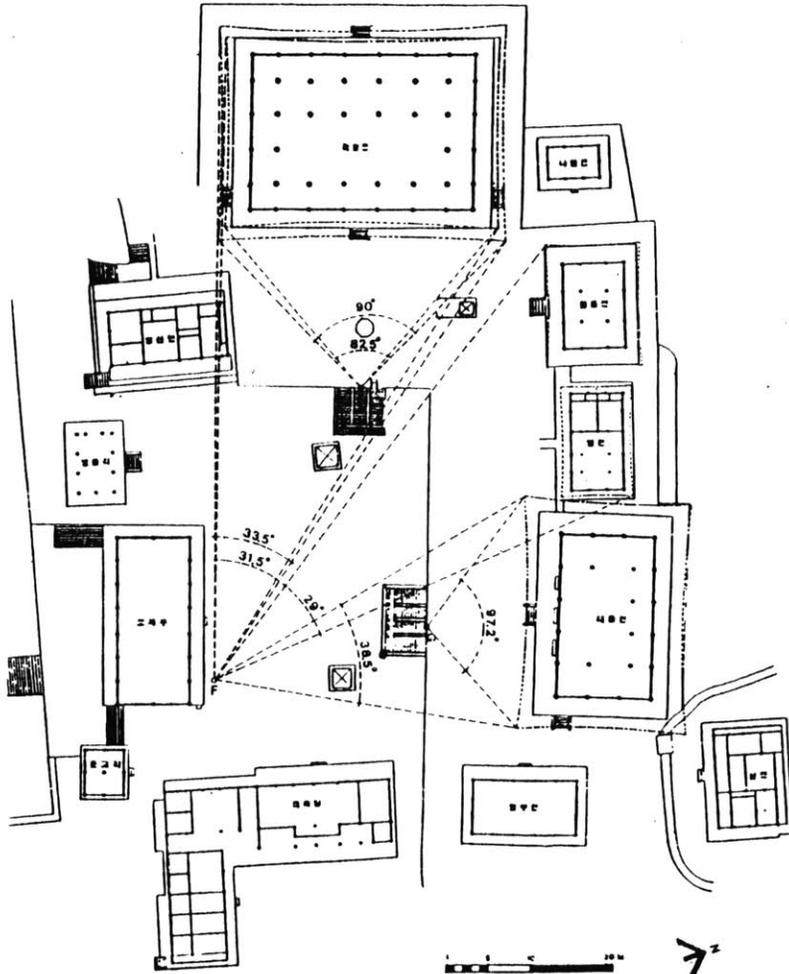




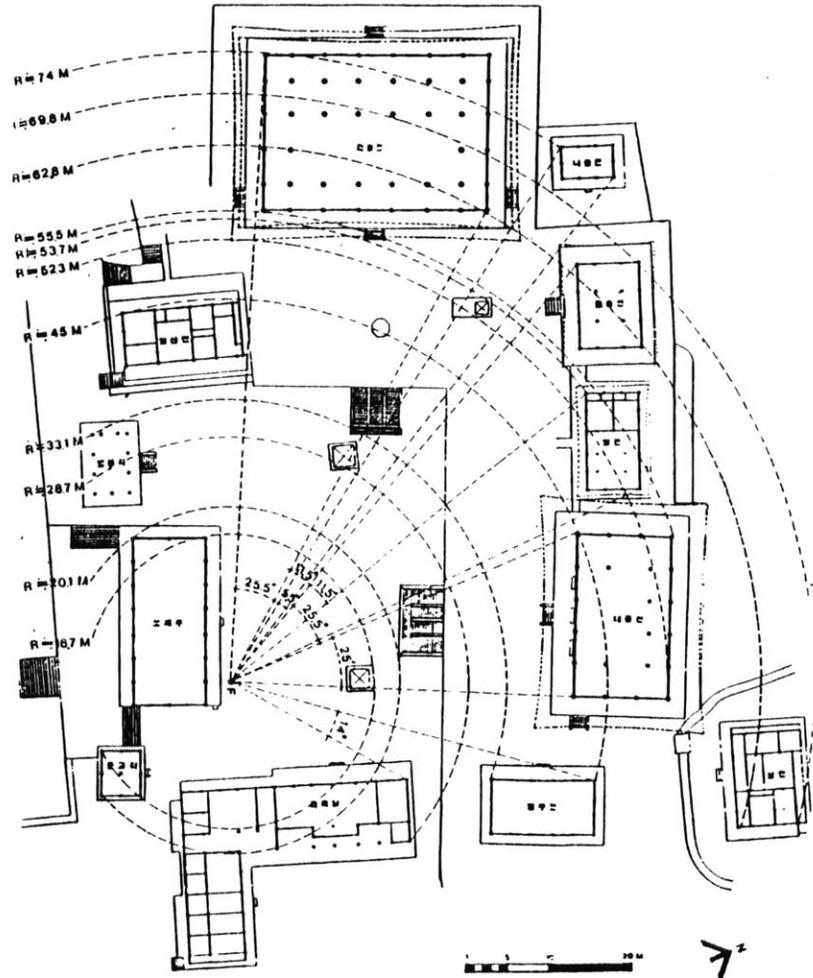
1. Use of the ten part system: Cos, Asclepeion.

Ten (Twelve) part system: The layout was determined by angles of vision of 18, 36, 72 degrees and etc. (30, 60 degrees and etc.), dividing 360 into ten (twelve) equal parts. Distance between buildings were a , $a/2$, $a/2a$ (a/b , $(a+b)/a$, $(2a+b)/(a+b)$). The area was thus divided into ten (twelve) parts.

2. A Korean historian's analysis of Korean space with the polar system of coordinates.



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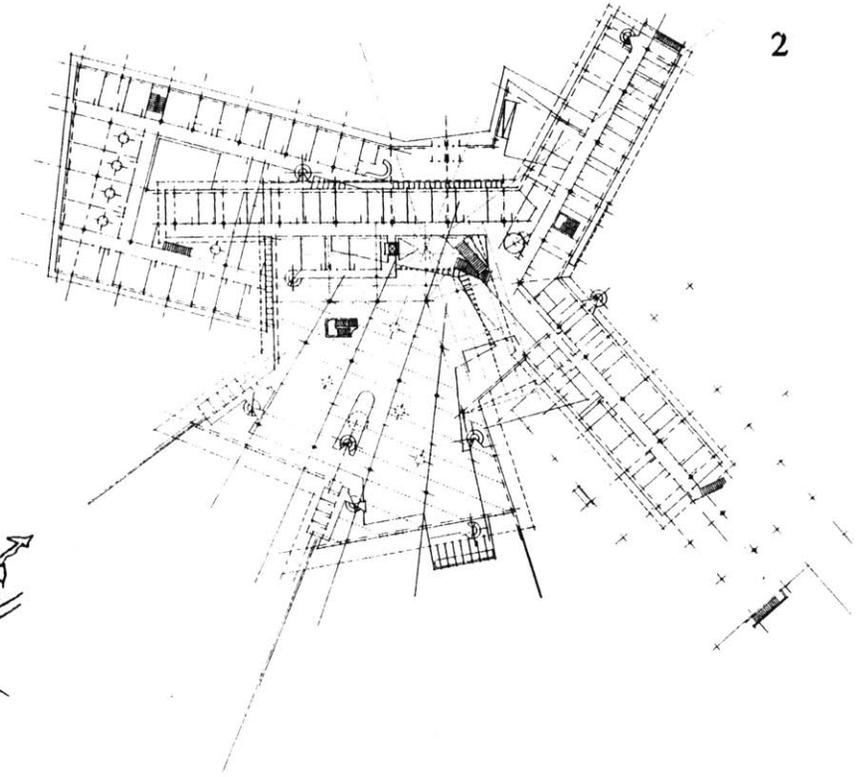
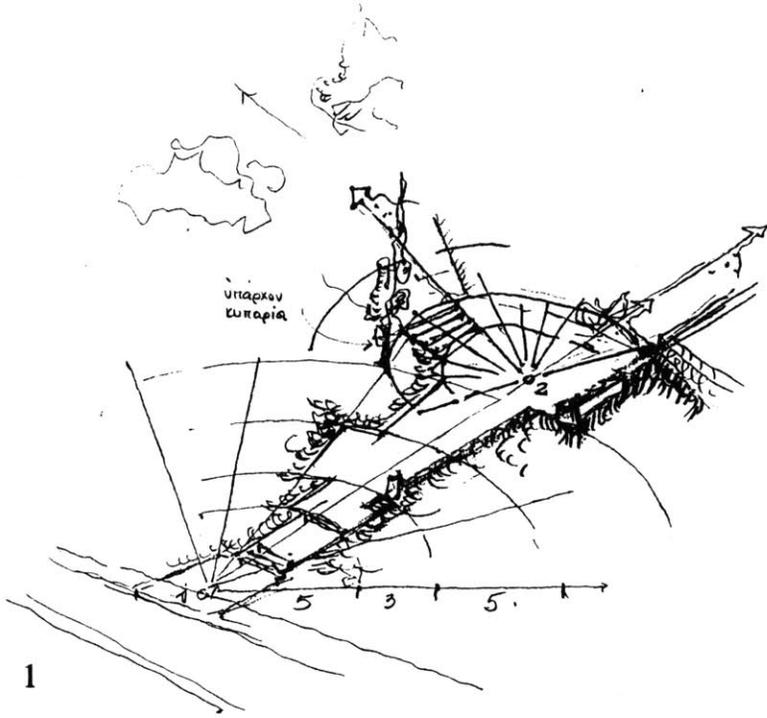
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1. A modern Greek architect, Dimitris Pikionis, has attempted to apply Doxiadis's theory of structuring space at the site of the church of St. Dimitris Loumbardiaris. Along the route up the Philopappou Hill, he has marked out a succession of 'critical' points where extended views are possible and

2. A German architect, Gunter Behnisch's unique design of Central Library at Eichstatt Catholic University. A 'critical' point was also used in this project.

Chang-Han Zoh, a Korean professor of architecture, tried to use Doxiadis's polar system to compare Korean and Greek temples but, unfortunately, could not find a very systematic correlation. We still do not know whether there existed a systematic space-structuring rule in Korean temples based on polar coordinates. But I believe that Zoh's study does not lose significance just because a systematic rule like the 10- or 12-part system failed to emerge. I think any effort to find common features or rules in studying ancient architecture is usually dangerous. The term "common" already excludes one strong potential of architecture--diversity. Furthermore, we are apt to hamper our intellectual efforts with a distorted obsession with canon, producing very monotonous and boring architecture.

As we saw in Greek architecture, the numbers 10 or 12 were lifted from a philosophical system without any serious connection to architectural values. Are modern Greek architects compelled to use a ten- or twelve-part system, as well? Certainly, their literal reuse of rules from thousands of years ago would be open to severe criticism. I believe the first mission of modern Greek architects is not to be bound by the old rules but to realize what their ancestors tried to achieve with the polar system of coordinates. When they are able to create an environment in which men can actually experience the spirit of their ancestors, then Greek architecture will excel again.



4.2 Objective understanding of space structure.

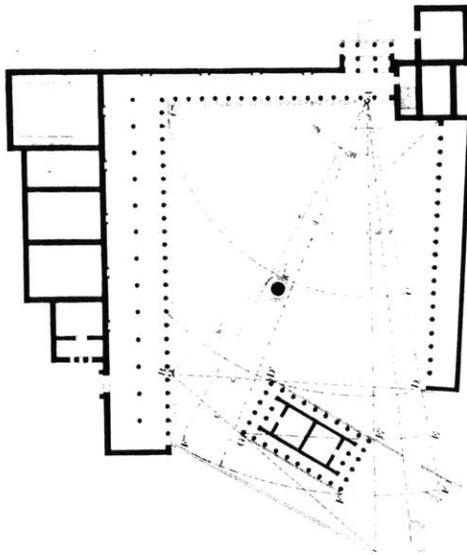
Doxiadis made a great discovery, but I believe his theory provides only a partial understanding of Greek temples. It is interesting that Doxiadis assumed the existence of critical viewing points on the site from which the whole lay-out was generated. These important points surely exist and I do not want to negate them. Nevertheless, a space cannot be a mere stage set to be directed and viewed from designated points. When somebody says he visited a place, he implies that he experienced and passed through a myriad of points in space. While we move from one point to another, space is penetrated and ultimately experienced and understood as a synthetic body.

I believe that ten- or twelve-part systems were used in Greek temples, but I do not believe that the general site was planned just for the visual experience of a few designated points. By angling buildings and locating walls with part systems, a very dynamic and organic spatial relationship for each Greek temple was generated. SooDuk Temple, then, recalls the Greek temples. Of course, it had been turned off-axis for a different purpose--most likely for the natural access. But the architect also realized the effect that simple turning would have on the space between the main building and the contemplation building. Thus, it becomes meaningless to justify only one idea apart from the actual experience we might confront: access or irregular space of the inner court. Greek temples, too, were designed both to be seen from certain points and to be experienced while moving between the points.

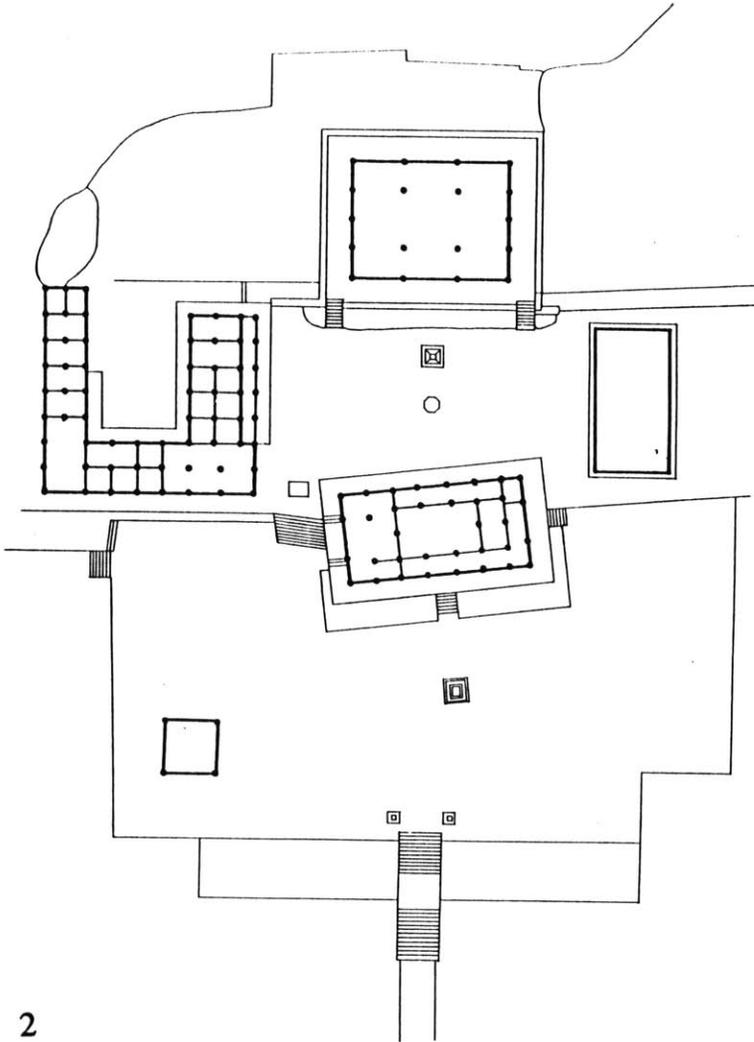
Turned buildings in similar ways but
with different aims.

1. Pergamon, Sacred Precinct of Athena.

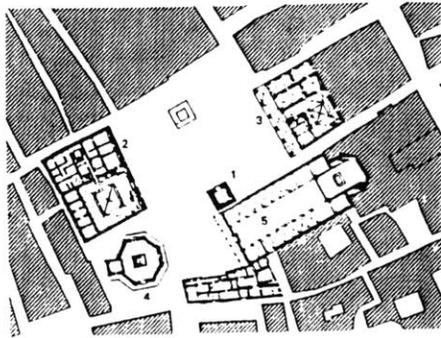
2. Sooduk Temple.



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Milan: Piazza del Duomo. A singularly simplistic site with its adjoining 19th-century Galleria, etc. . . . , the cathedral's own length is repeated to bound the extent of its open forecourt.

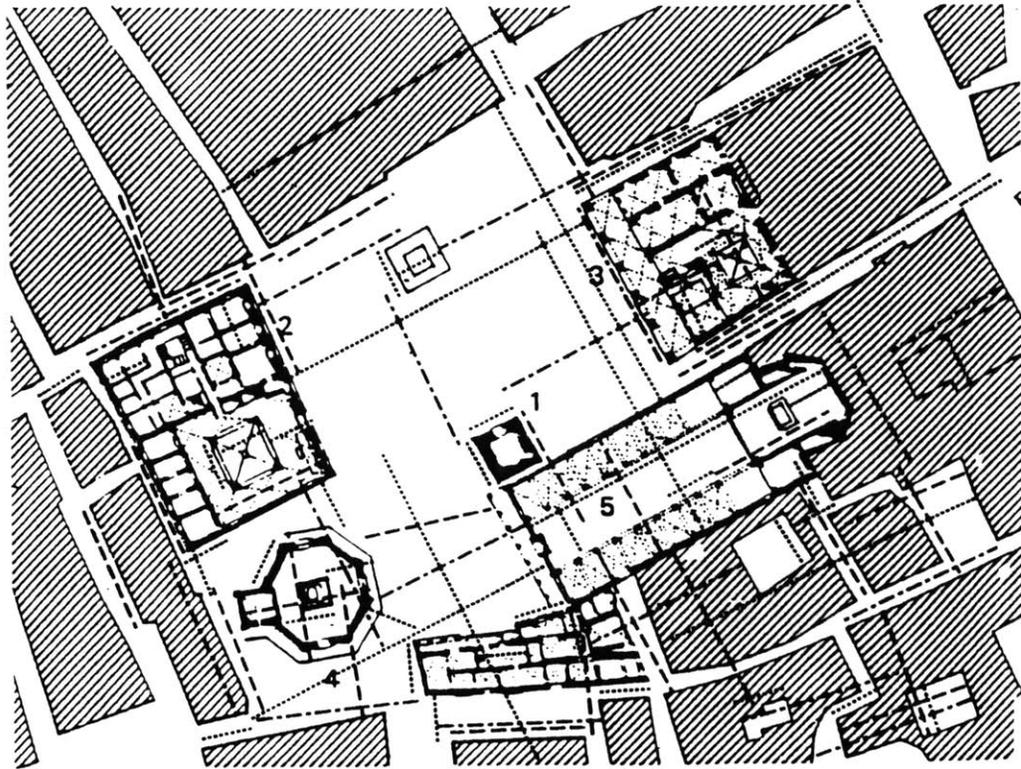
Palermo: Piazza Pretoria. The two churches, St. Caterina and Martorana, almost normal to each other, each maintain building length ahead. Between them is Piazza Bellini (Martorana is "buried" in (?) later "fabric") defined by Caterina equally accurately by its laterally displaced width.

4.3 Maurice Smith's approach

An approach to reading space as a synthetic body was featured by Maurice Smith in his article "Dimensional Self-Stability and Displacement in Field-Ordered Directional Alternations." To some, his diagrams may seem obscure because he does not justify or explain what he is trying to achieve. Yet, I have come to believe that his way of analyzing space has some merits as a tool toward understanding the spatial structure of a built environment. In the article, he states that "Behaviour / organization Systems" comprise three factors: Field Organization, Territorial Control, and Alternations / Self-Stability. And the most habitable and associative built environment arises from Directional Field Organization, Open Field, Edges, Dimensional Equility, Reciprocity, and Light-Dark Reversals.

For the most part, his study focuses on dimensional stability or dimensional equality. He tries to understand spatial relationships in architecture by tracing equivalent dimensions. He also applies the same method to two-dimensional media such as drawings for magazine covers.

In several aspects, Smith's approach to spatial analysis differs fundamentally from Doxiadis's. First, in Smith's case, it is not clear what he ultimately wants to achieve with his method. He seems to imply that the more certain dimensions are repeated, the more the stability of the two- or three-dimensional structure is



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1. Maurice Smith's three dimensional study

Pistoia: Piazza del Duomo

The structuring double-directional dimensional displacement observed in Iberian towns / villages, doubtless controlled / measured by inspectoral / agreed authority / chains / knotted ropes (?), is also manifest in intensified (European) urban plazas, e.g., this one.

The Duomo's (#5) length (longest dot-dot tape, circa 70 meters) displaced longitudinally and laterally demarks the major plaza boundaries / extent. It also positions (when containing Duomo width) the west side of City Hall (#3) and, usually including one or more access ways, is a recurrent building / block size.

City Hall width (dot-dash tape), circa 37½ meters, is also Pretoria (#2) depth.

Duomo width (dash-dash tape) is circa 26 meters.

The shortest of the 4 dimensions / sizes tape-shown-street going (short dot-dot, circa 10 meters) demarks also the narrowest building width, baptistry facets (#4), Duomo nave width, belfry side (#1), courtyards, large rooms, etc. . . .

This equivalents at public / collective size the behaviour of the small red / personal-size tapes = one loaded-donkey width in Casares, etc. . . .

Behaviour, then, may be "fractal" at different sizes, but end-result form is not.

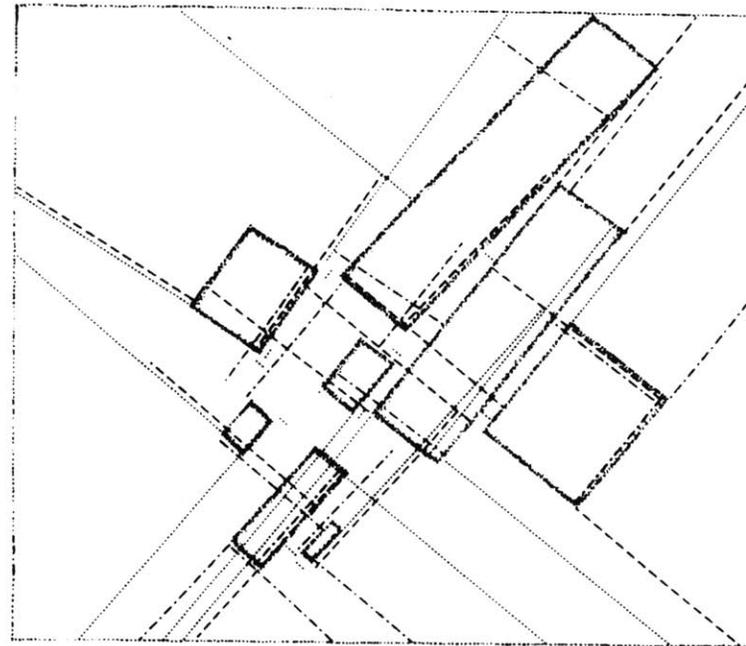
Similar demarkational systems are evinced in many elsewhere, e.g.

1. Maurice Smith's two dimensional study

Eight Red Rectangles, 19XX

The pieces are area-derived and "plate-shifted" from two squares: one, the length of 2nd top rectangle; the other, its width. All 8 "mobiling" parts are firmly "nailed" to the including (9th) frame / site and / or #2. Although seemingly much looser and more complex than "the red + the black square," the same methods pertain. Each demarkation is precisely positioned; the middle-size series are tape-omitted to retain clarity.

As in "architectural" plazas—domestic, collective, public, CORDOBA COMBARRO PISTOIA etc. . . .—primary territorial positioning is double-directionally stabilized, while the "uses" of each dimension vary / "reverse."
The size range (may even) analog proportionally—from building / block size (#2 length) to the smallest (#8) section, which, of course, equals the normative smallest "field access" and inverse / obverse "passings."
The entire field then is a "supreme" study in intrinsic / dimensional self-stability.



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fortified. But this concept is not as clear as Doxiadis's adoption of the polar-coordinate system, which was justified in terms of human orientation. Also, while Doxiadis's clearly defined goal was to unveil the rules of ancient architecture, Smith does not seem intent upon discovering hidden rules or principles. His description of the meaning of repeated dimensions is not easily grasped. Moreover, he seems more interested in the process itself as a way to understand space.

In the above sense, Smith's approach may not be so meaningful and useful if we want instant conclusions. Trying to trace similar dimensions by rote could be tedious. If not so lucky, we might need quite a while to locate a second matching dimension in a given place. What may make us more nervous is that we do not quite understand what repetition of the same dimension means. Nevertheless, after my own trial of Smith's method, I have become convinced that the simple process could be very helpful in understanding space.

V. ANALYSIS OF KOREAN SPACE

5.1 Methodology of analysis

Some Korean spaces are analyzed and presented in this section. Before proceeding to the analytical part of my study, I explored in depth the following buildings. Unfortunately, I could not include the plans of all the buildings I visited--five temples and seven houses--because of incomplete information. The examined buildings will be categorized into temple or house according to the building program. However, the more important characterization is of the 'spatial structure' of each building. In this sense, the six presented buildings can be classified into early or later spaces of Korean architecture.

As an example of early Korean space, Buluk Temple contrasts well with the later spaces of non-diagrammatic architecture. Also in this section, two houses are introduced. Thus far, only the development of Korean temples has been describe, because the overall development of Korean temples is more easily observed than that of Korean houses. Existing traditional Korean houses were built within the past five centuries. Information beyond the existing buildings is limited by the lack of research and accessible data. The two houses included here are actually not so old, as they date from the early sixteenth and mid-nineteenth centuries, respectively. They were built after the later temples had fully developed a spatial structure.

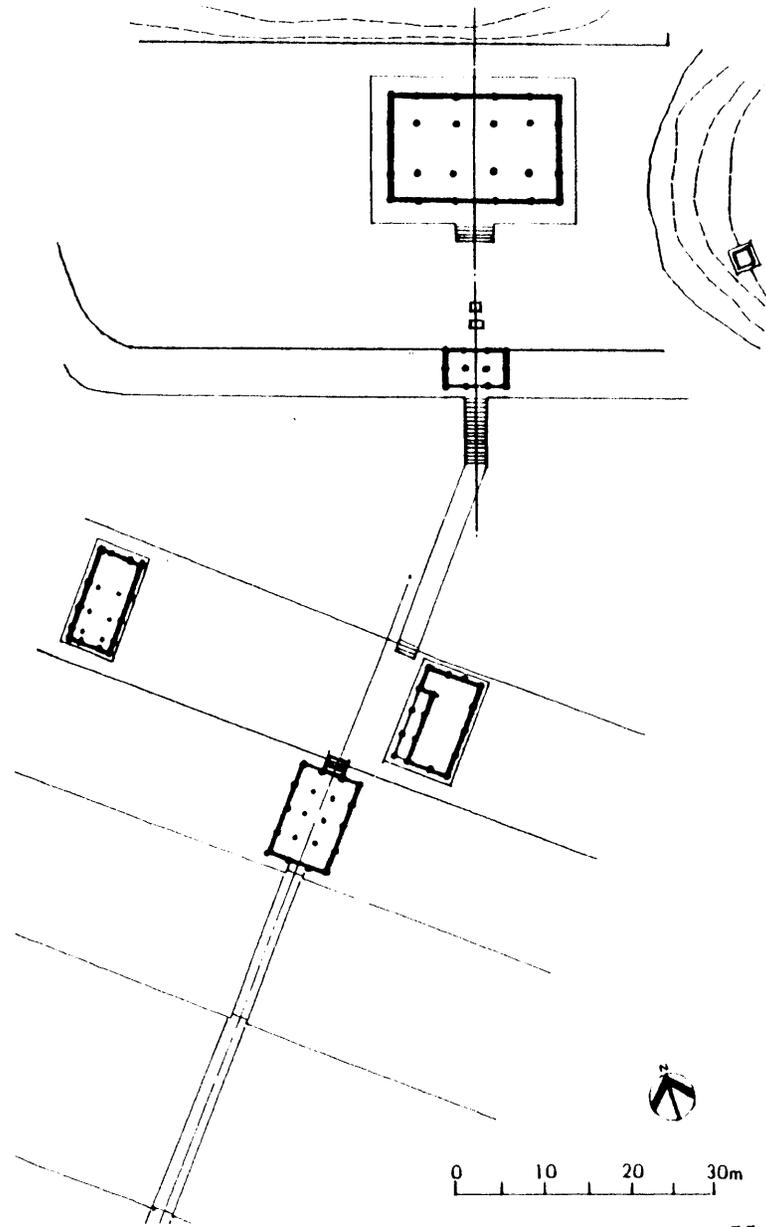
After my trip to these places, it was a pleasure to recall the spaces on paper. I looked for similar dimensions throughout the plans, asking myself questions such as “Why does this dimension get repeated again?” or “Why is the angle of the main axis turned here so abruptly?” It was rather a soliloquy in which I questioned and answered.

As with the Sooduk temple, I continually tried to interpret the meanings of each action committed by the architect, as ultimately I hoped to understand how each project had been carried out.

First, the plan of each building is presented, followed by dimensional studies of the plan and some questions I had in mind in analyzing the space. But, I decided not to include my subjective answers or interpretation as I did in the previous chapter on Sooduk Temple, because I thought more emphasis should be laid on the process of questioning and seeking answers regardless of immediate plausibility. Additionally, the analytical drawings that do not show plan provide a different viewpoint on each project, leading us to rethink the special structure of each project.

Busuk Temple

부석사



1. Busuk temple, plan.

5.2 Busuk Temple

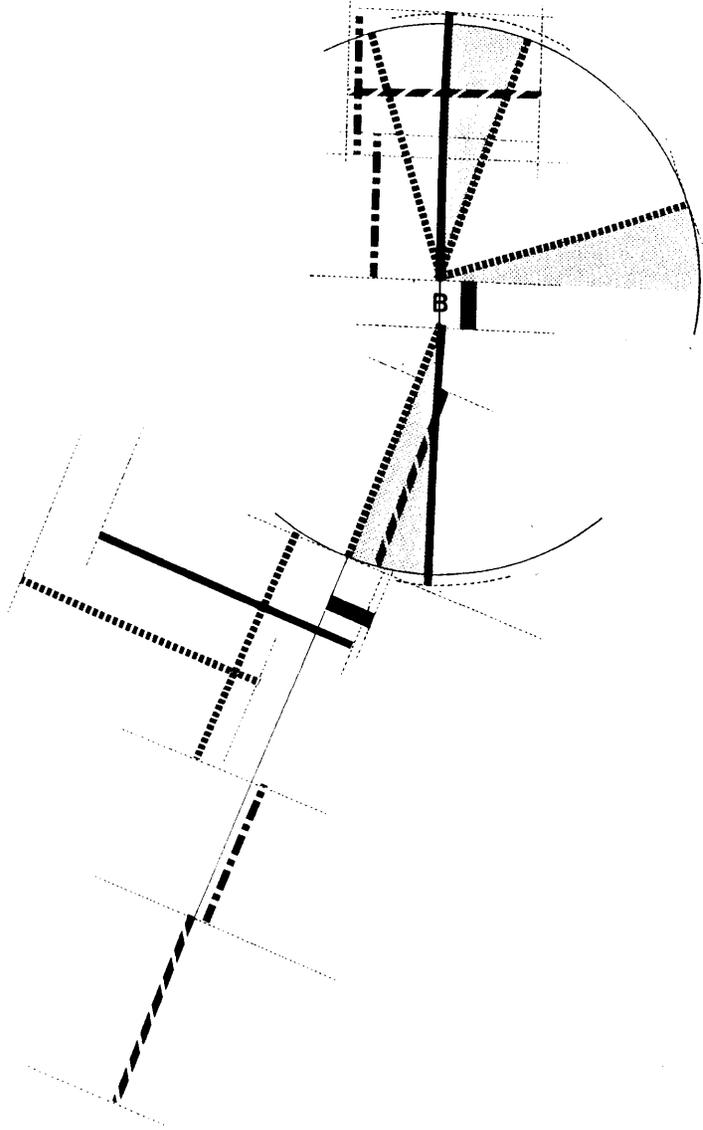
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1. Busuk temple, space structure.
2. Busuk temple, space analysis.
3. Picture showing the major space.

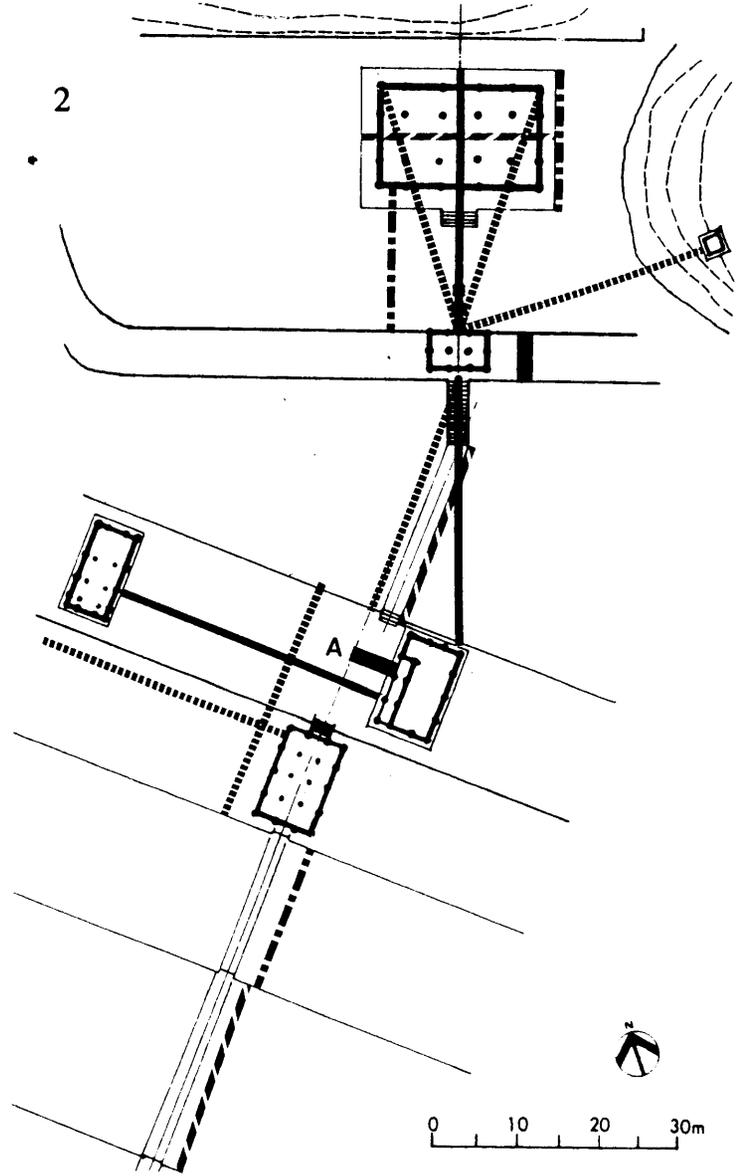


- The main axis is separated near point A. Is it a mere coincidence that there are two buildings on the same terrace as point A?
- The main axis is turned by about 30 degrees before we enter the major space in front of the main building. What caused this turn in axis?
- The same 30 degree turn is also found in the planning of the major space in front of the main building. Is it mere coincidence that similar angles are used to locate the main building and pagoda?
- Could we say that a polar system of coordinates has been used in this temple? Is B a 'critical' point?
- The depth of the main building decided the dimension of the frontal space. Why?
- Interestingly enough, the dimensions of the stepped terraces are repeated in the major space and the main building dimensions. How can we interpret this?
- What was the first step in designing this project? Could we say that it was the idea of a bent axis along which very careful dimensional relationships were formed instead of thinking about traditional architectural forms and arranging them along an axis? What was it?

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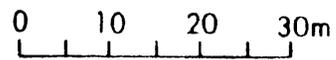
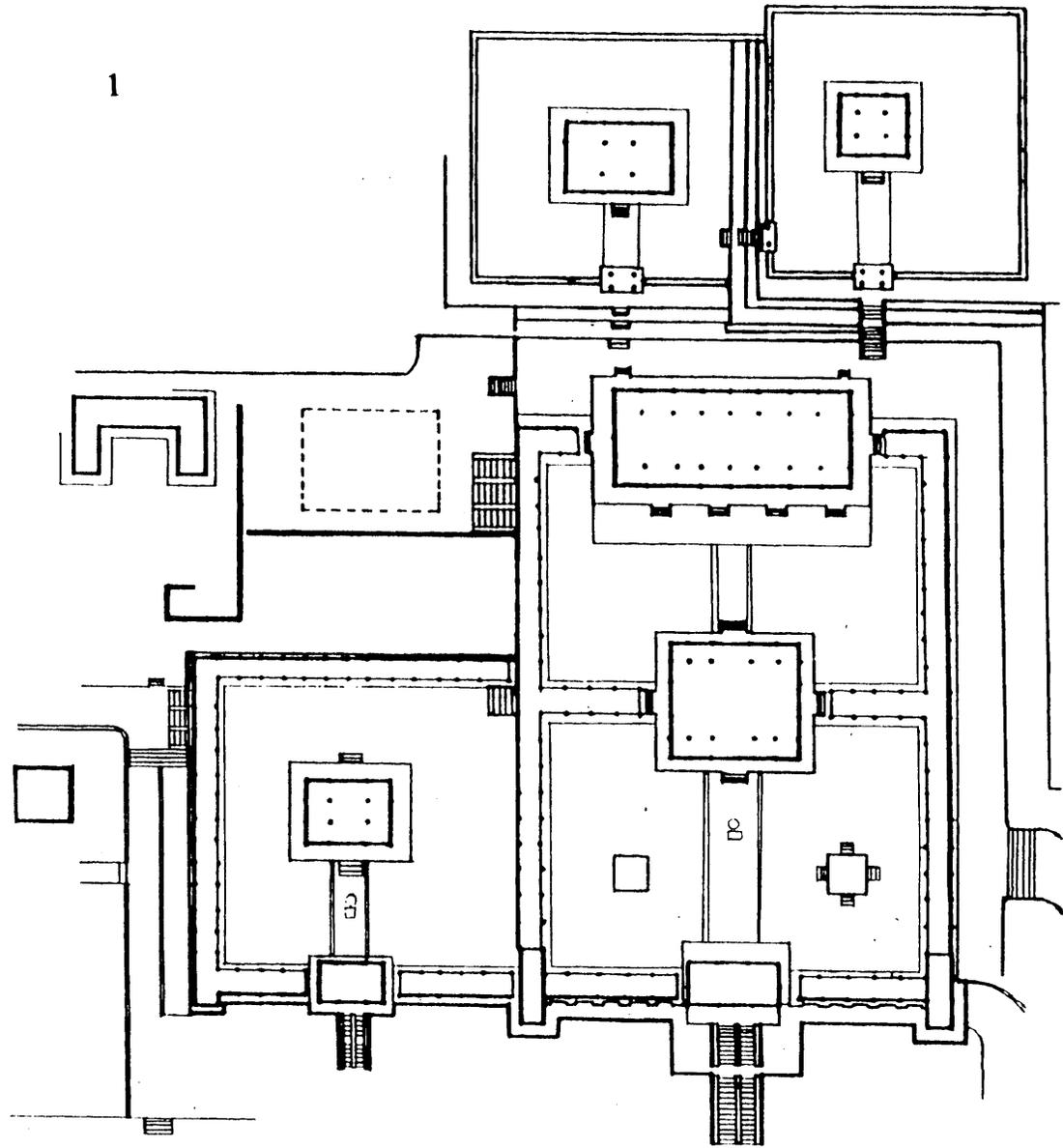


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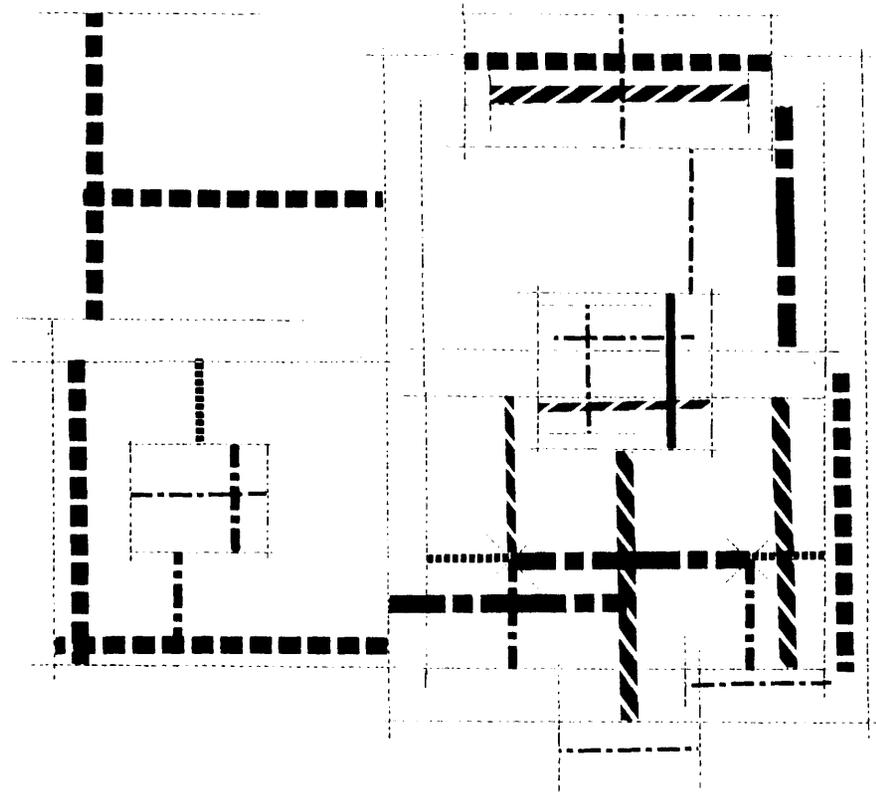
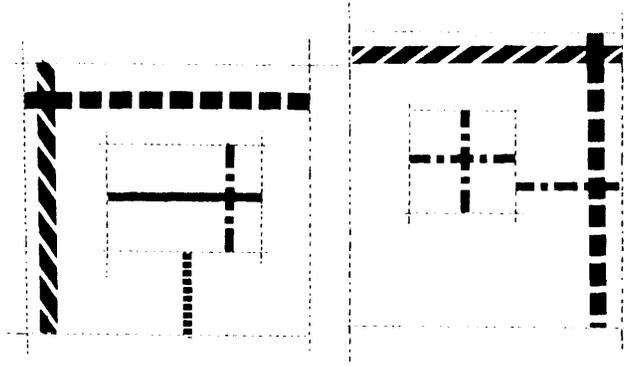


Bulkuk Temple

불국사



2

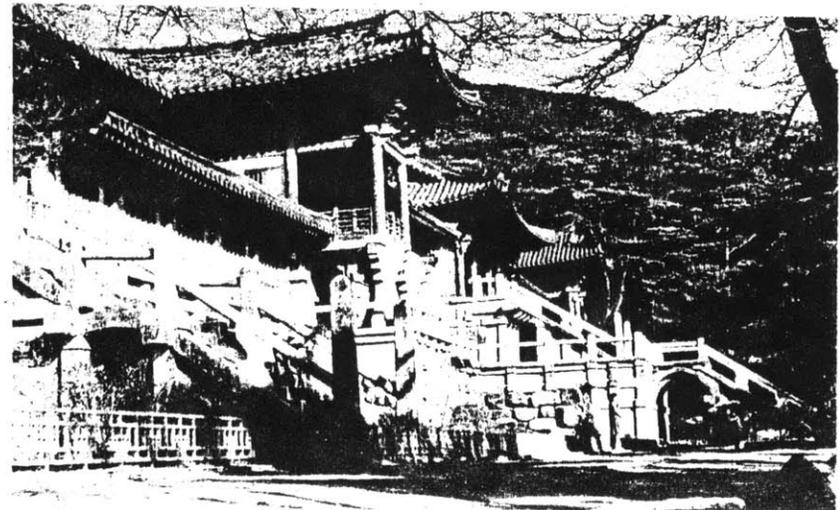


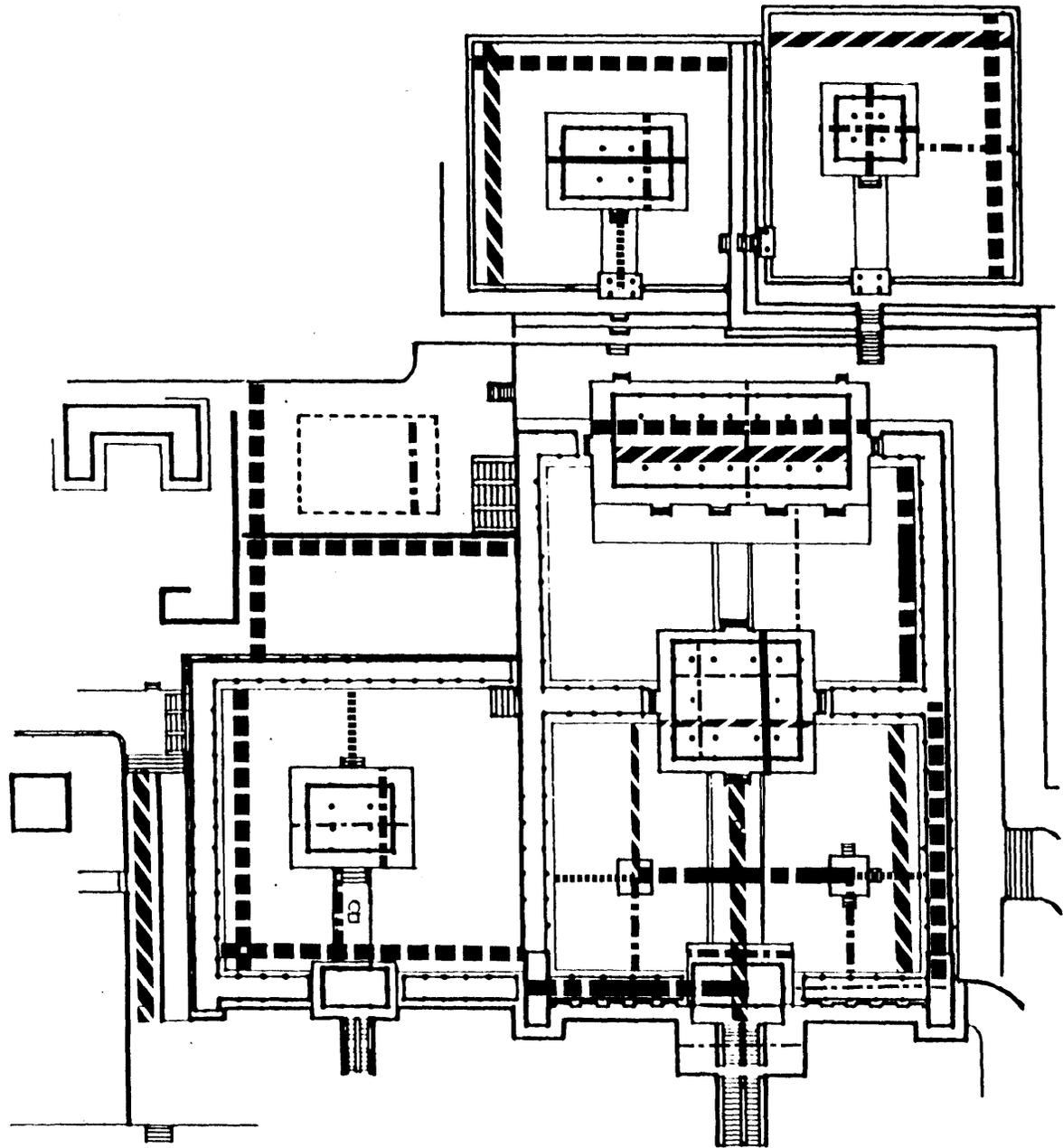
1. Bulkuk temple, plan.
2. Bulkuk temple, space structure.

5.3 Bulkuk Temple

Period: 6C

- Should we assume, because the space is very directly transformed from the diagram, that this is a bad example of Korean architecture before it had matured into a very non-diagrammatic space?
- We saw three later developments in the Amitabha Temples. Where are the major changes? In the axis or the adjacency between two spaces of Amitabha and Shakamuni?
- How about dimensional relationships? Some dimensions are used repetitively thereby creating a very formal structure. But a critical element seems to be missing here.

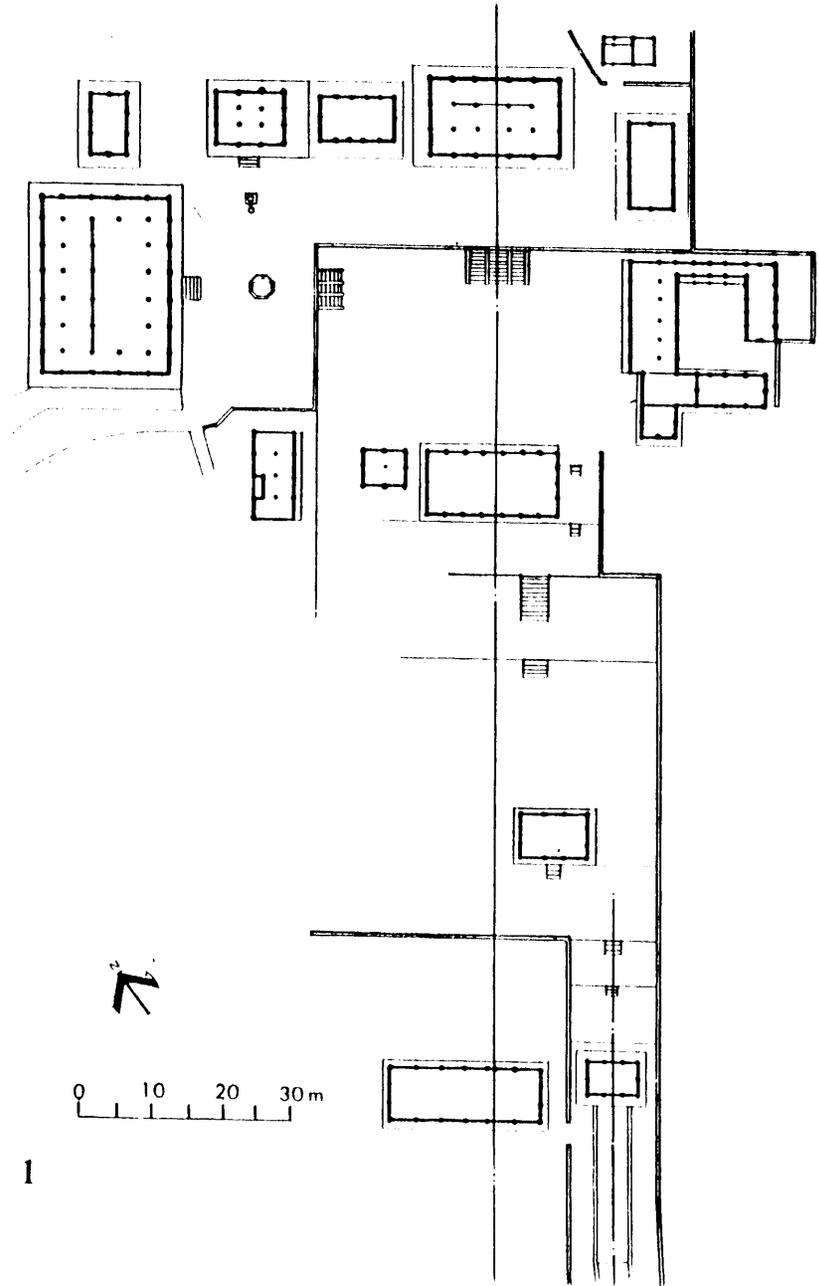




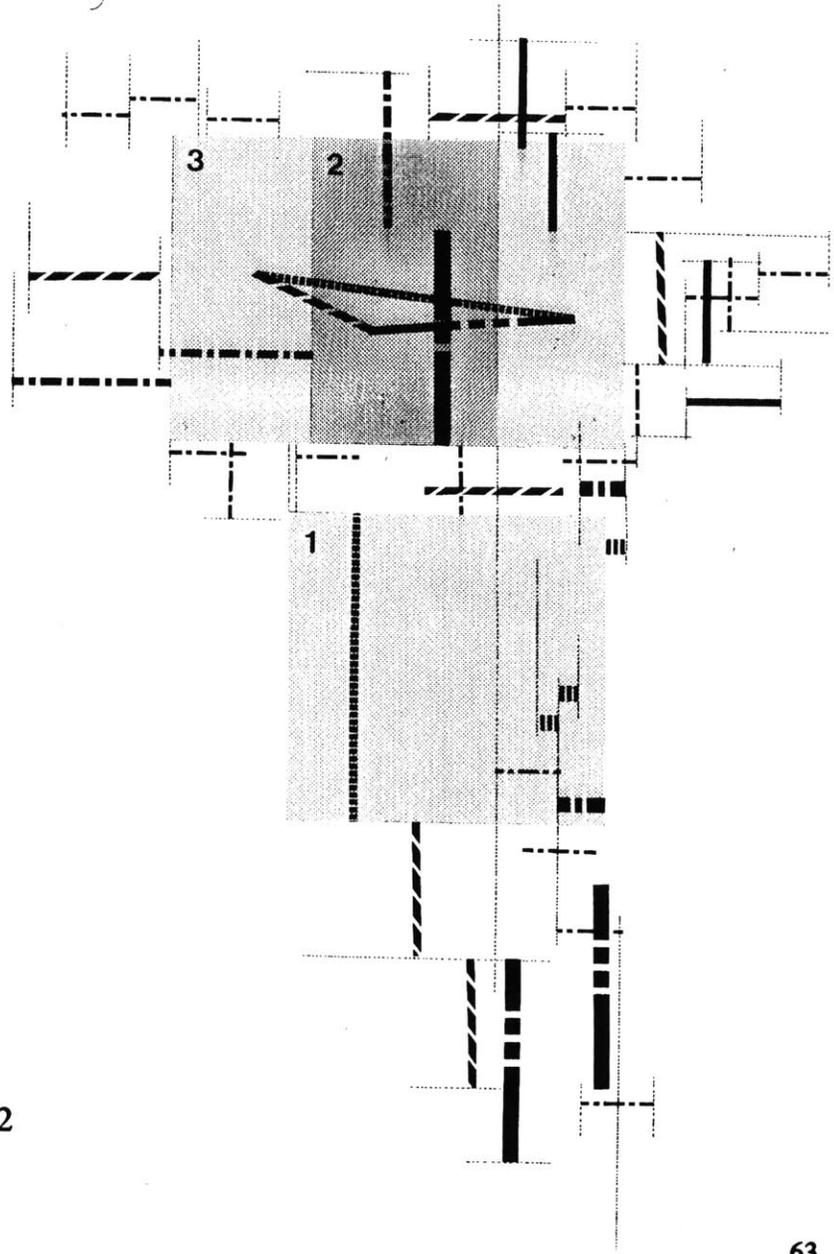
1. Bulkuk temple, space analysis.

0 10 20 30m

화엄사



1



1. Whaum temple, plan.
2. Whaum temple, space structure.

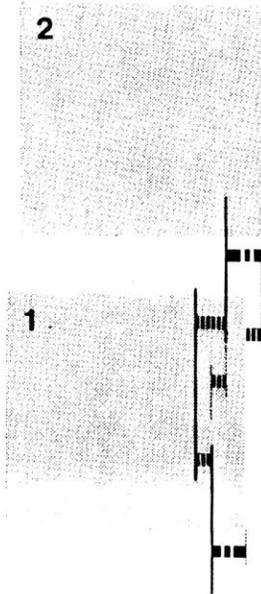
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5.4 Whaum Temple

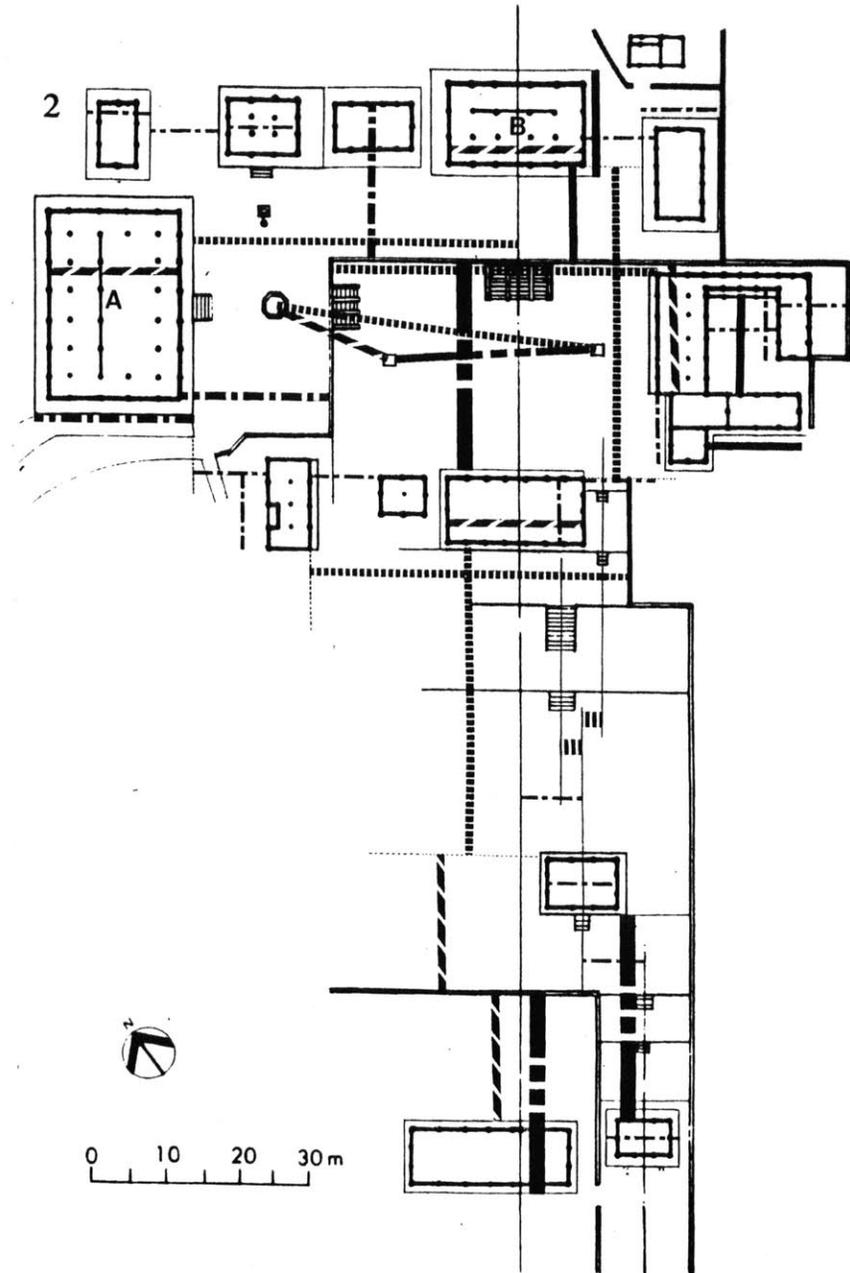
Period: founded in 6C and extended in 17C

- Basically, this temple seems to be designed according to three squares. Square 1 was repeated once more in the major space forming Square 2. Then, could we say that square 3 was added as an extension of the major court space and the largest building A?
- There seems to be some relationship between the overlapped part of square 2 and 3 and the sunken part in the major court space. They almost have the same dimensions. Do you think the overlapping of the two squares have some relationship with the size of the sunken part?
- The shift of the main axis is very dynamic in this temple, and I found that some logical interpretation could be applied to this matter. The relation between squares 1 and 2 has some connection with the shift in axis. It seems very natural that the architect would shift the axis several times if we admit that the locations of the squares were pre-conditions of the site layout.
- The depth of the major buildings A and B also seems to have come from the dimensions in front of each building as in the case of Busuk Temple. Was this matching principle common in planning of Korean temples?
- How about the location of the two pagodas? Do the distance and relationship among the three pagodas bear meaning for the whole spatial structure?
- How about the general layout of the whole site? Many dimensional equalities are found in this temple. Do the dimensional repetitions have some significance in this case?

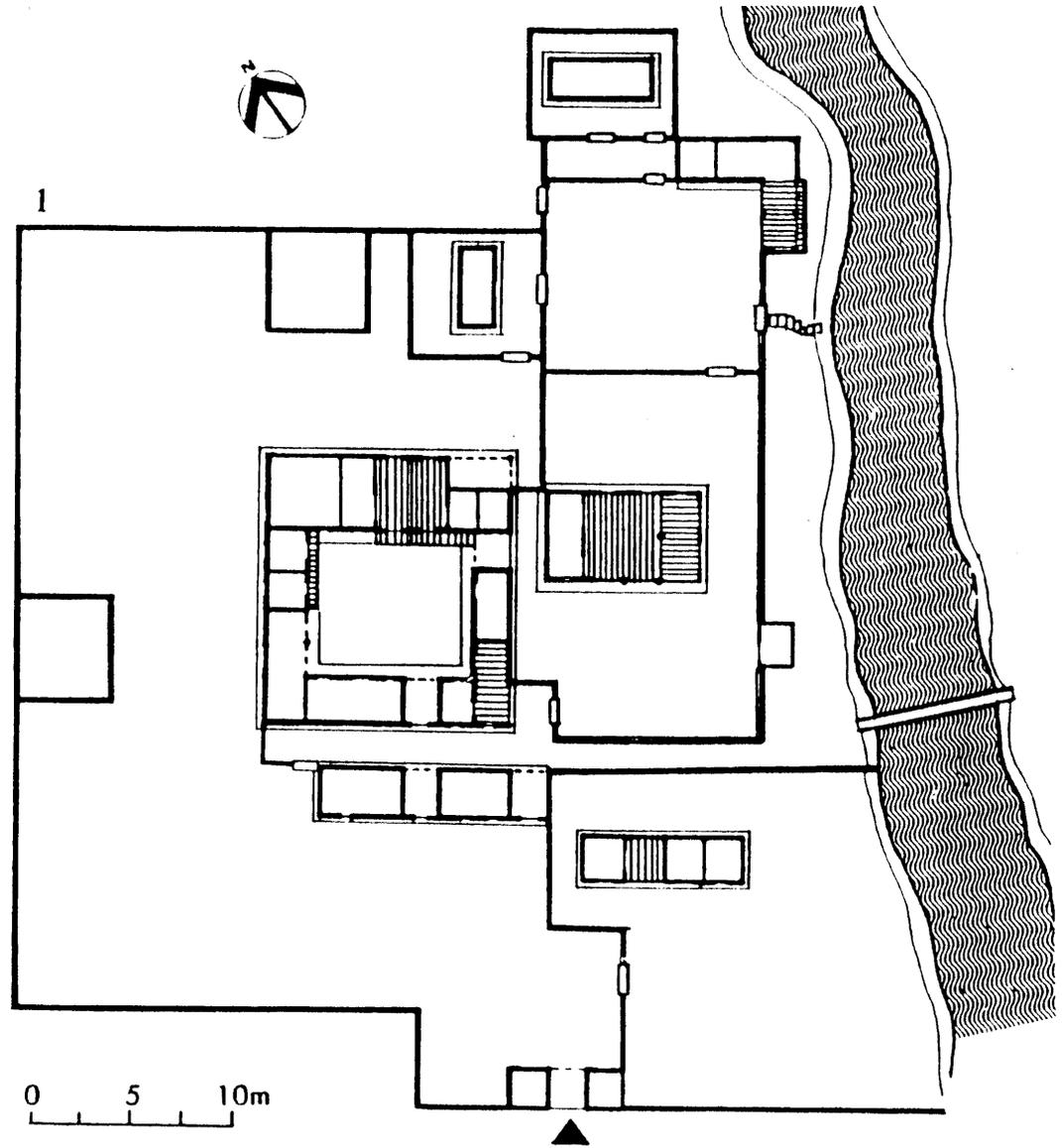
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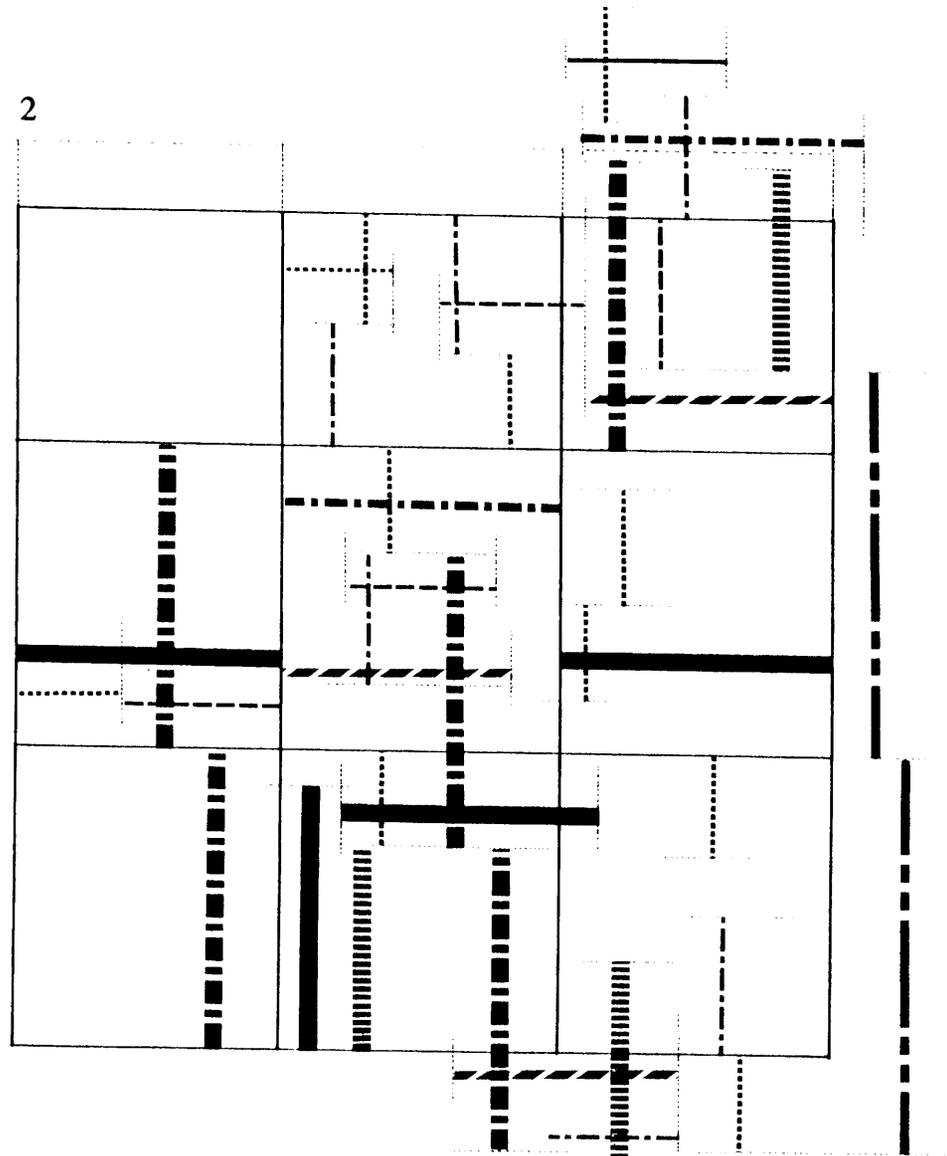
1. Diagram showing the two related squares and the shifts of axis
2. Whaum temple, space analysis.



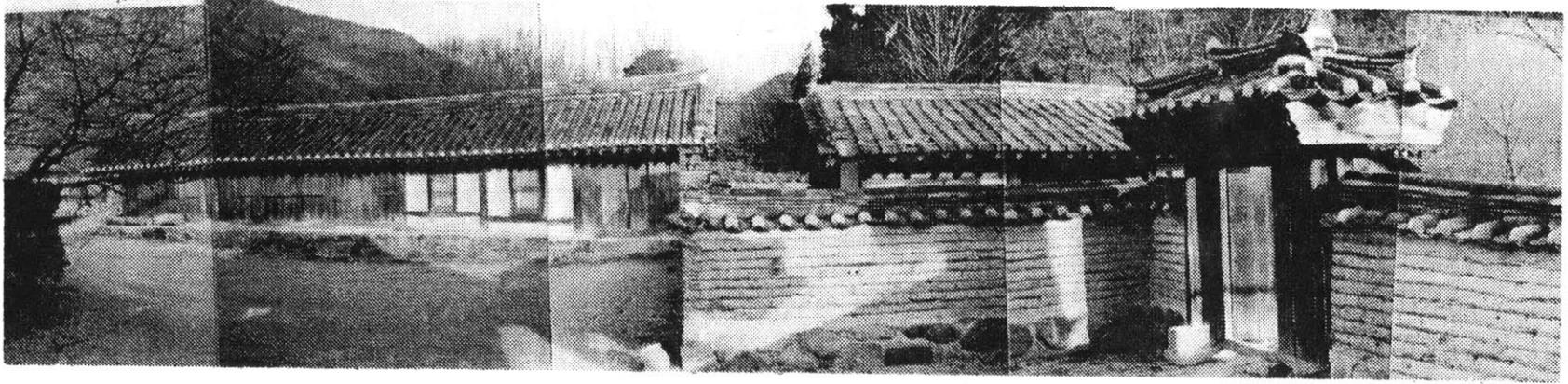
독락당



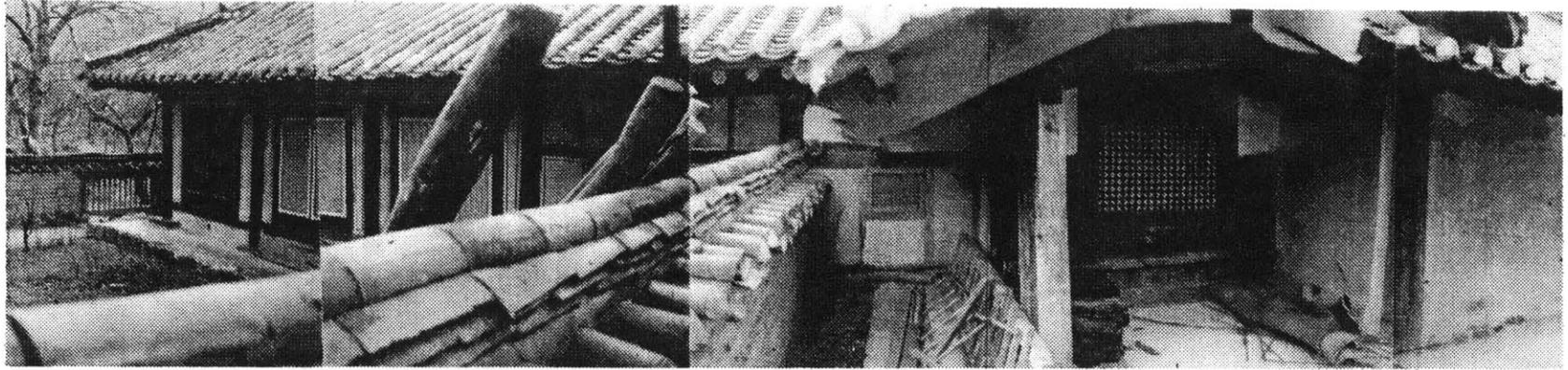
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1. Dokrak house, plan.
2. Dokrak house, space structure.



1. Dokrak house, frontyard.



2. Dokrak house, backyard

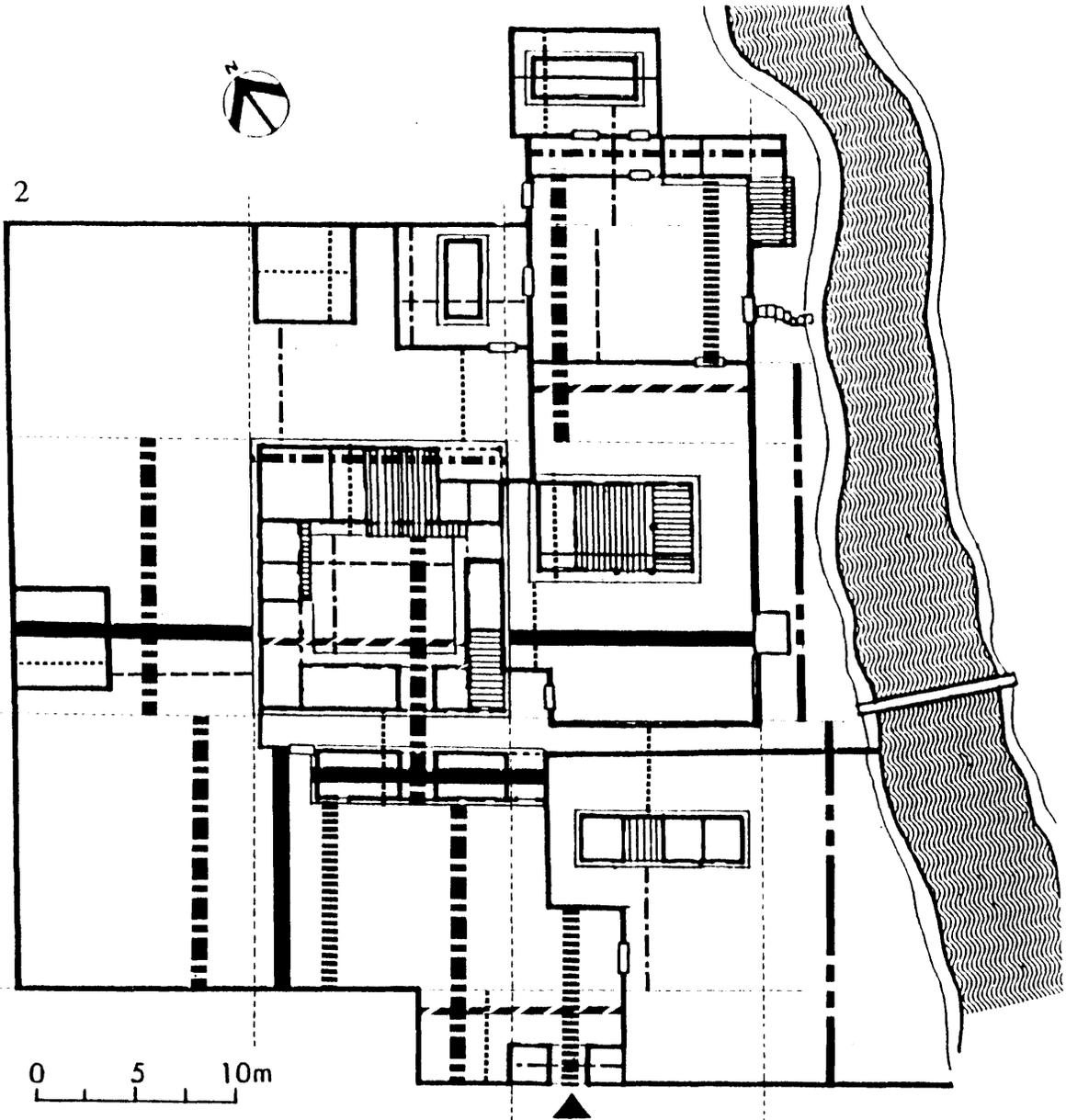
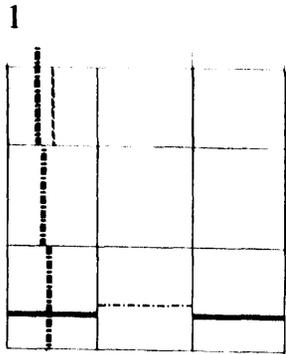
5.5 Dok Rak House

Period: 16C



- Did the architect envision, in the first stage of designing, a kind of spatial grid system divided into nine similar parts?
- If we accept this, could we connect this kind of systematic approach using a grid system with that of Frank Lloyd Wright? Of course, the two approaches have different aspects. Wright's usually applied to the design of the house itself while Dok Rak House occupies a grid system that encompasses the whole site. But I have come to believe that this is not the grid system frequently used in modernistic architecture for structural or economical convenience.
- How was the decision of each part made? With the square grid, some dimensions seem to inform the whole spatial system. Why are some dimensions repeated while others are not?
- Finally, is a spatial grid a useful tool in designing a building? Can it act as more than a construction grid that decides the location of columns and walls?

1. Dokrak house, space grid system.
2. Dokrak house, space analysis.



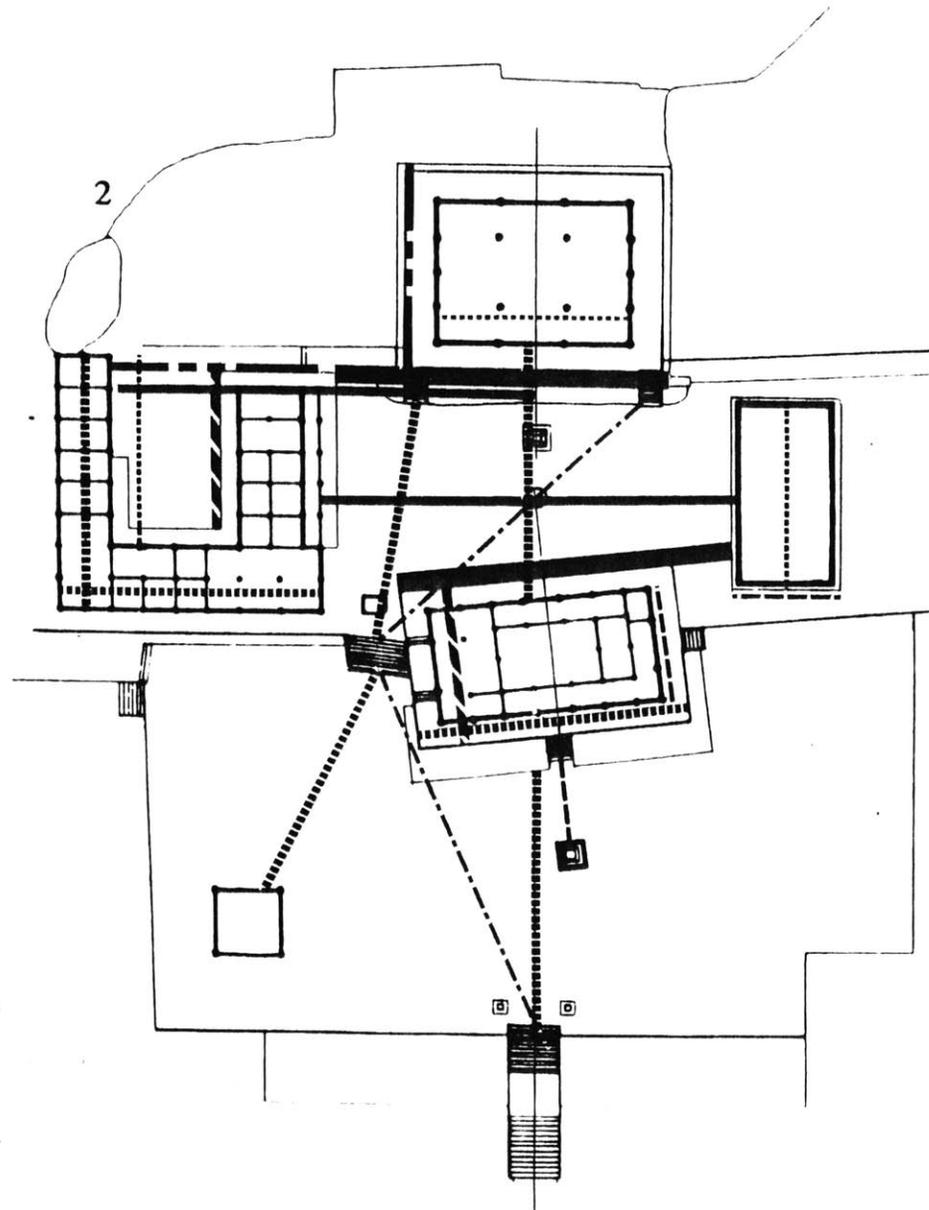
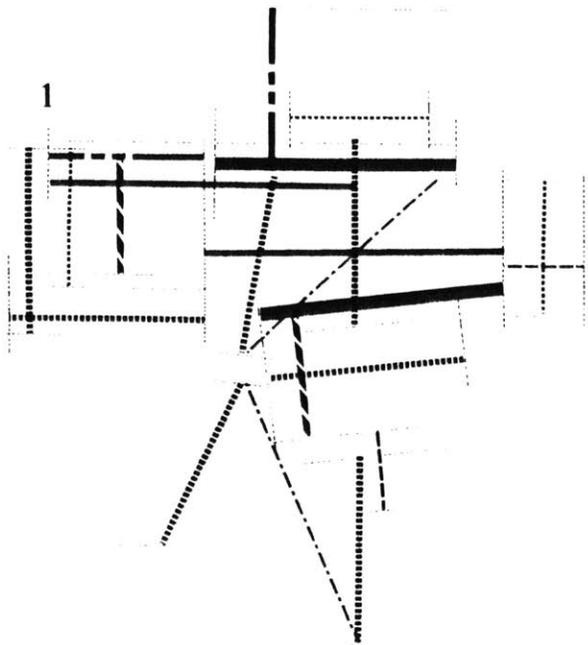
5.6 Sooduk Temple

Period: 14C

- What was the major driving force of the angle changes in the Contemplations building and adjacent staircase?
- Can we understand the changes already described in the previous section with more clarity now?
- How about the repeated dimensions between stairways?



1. Sooduk temple, plan.



1. Sooduk house, space structure.
 2. Sooduk house, space analysis.

Bukchon House

북촌대

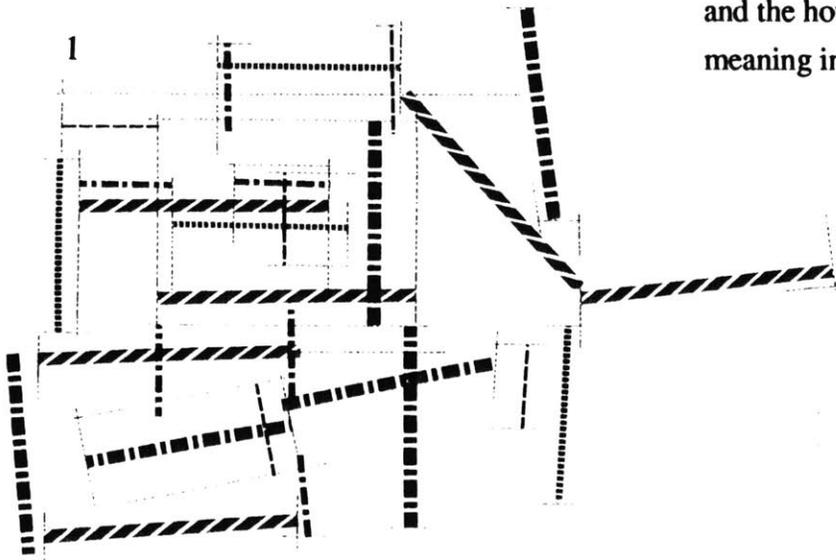


1. Bukchon house, plan.

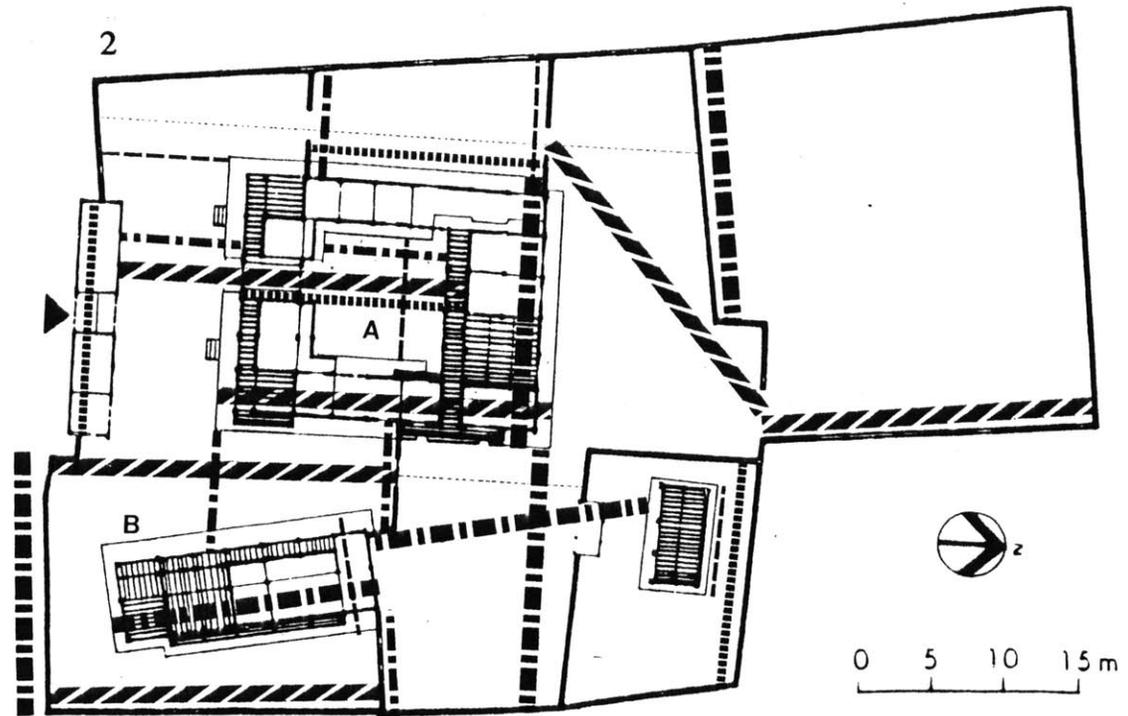
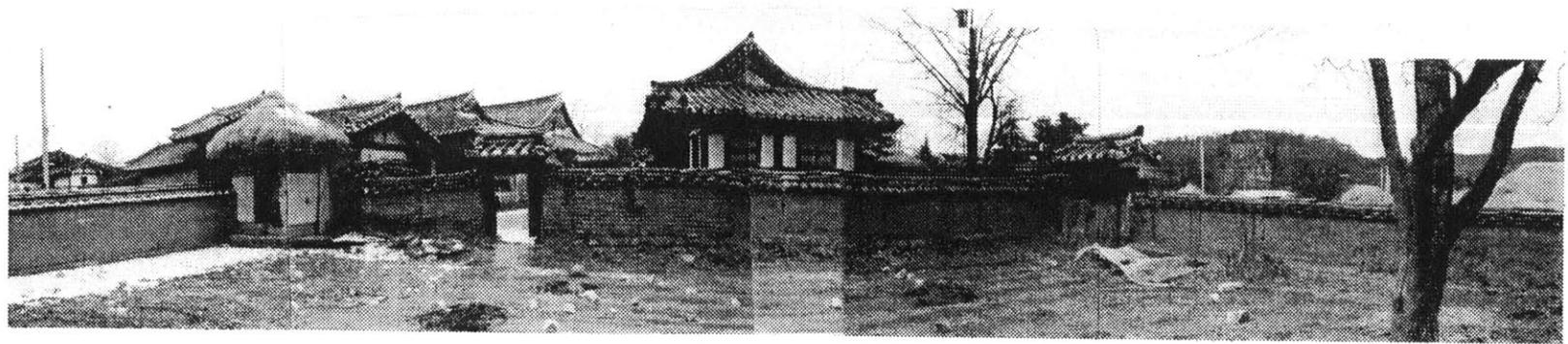
5.7 Bukchon House

Period: 19C

- Three major dimensions were found in this house. The depth and width of the main building, and the dimension between the gate and the far edge of the inner court of the house. Are these dimensions critical in this house?
- How about the turned building B, beside the main building A? Is there an intention involved similar to that in previously discussed cases?
- In this house, besides the sizes of the house itself, the sizes of the inner court were repeated in designing the surrounding spaces between the garden walls and the house. Does the irregular shape of the site layout have some meaning in connection with the cozy size of the inner courtyard?



1. Bukchon house, space structure.
2. Bukchon house, space analysis.



VI. DESIGNING A CREMATORIUM

6.1 Solving a wicked problem

Designing a building involves a different process of using cumulative knowledge than that for solving a mathematical or engineering problem. Many design theorists describe the architect's problem as a "wicked problem" having no clear goals and criteria for testing solutions, whereas problems in science or engineering have both these clarifying traits.

Because of these obstacles, it is hardly possible to define the problem's parameters and derive the efficient way to the solution. Thus, architects meet with frustration as they enter the design labyrinth. The absence of a definitive formulation for the "wicked" problem means, also, that there is no singular solution. We may believe that a right solution could be any solution. This inclination sometimes leads architects to rely heavily upon their subjective instincts or inspiration in attacking an ill-structured design problem which has no boundary or base from which to begin thinking.

We understand that designing a building is a different problem-solving process than that for mathematics, in which most of the conditions or tools are clear and the cumulative knowledge directly connected to the solution. Then, what can be the role of acquired knowledge in the architectural design field?

To answer this question, Bryan Lawson's study is very meaningful. His main interest is in the difference between the designer's problem-solving behavior and that of the scientist. Lawson starts with a generalized view of architectural design, in which architects' primary and central task is to produce a "concrete" three-dimensional structure of space and form to accommodate an abstract structure of related human activities.

In a controlled experiment, he compared both fifth-year architecture students and fifth-year science students. He devised a task requiring them to produce a spatial configuration of elements that achieved a generally defined goal while satisfying a given rule. More specifically, the task involved selecting and arranging colored blocks of different shapes so as to maximize the amount of a given color showing on the outside faces, with the additional criterion that certain blocks be present.

Most interesting was Lawson's analysis of the differences in problem-solving strategies between the two groups. He discovered that, in general, the science students attacked the problem's structure at the outset, while the architecture students generated a sequence of high-scoring solutions until one proved acceptable. Lawson called the scientists' strategy 'problem-focused' and that of the architects 'solution-focused'.

The architects had learned that the most successful way to tackle the design problem was by going ahead and proposing solutions, bypassing a tedious

process of analysis which often turned out to be useless. Just in proposing a plausible solution, the architect discovered more about the problem and acceptable solution. The scientists preferred the rational approach of first analyzing the problem and attempting to discover its hidden rules before proposing a solution.

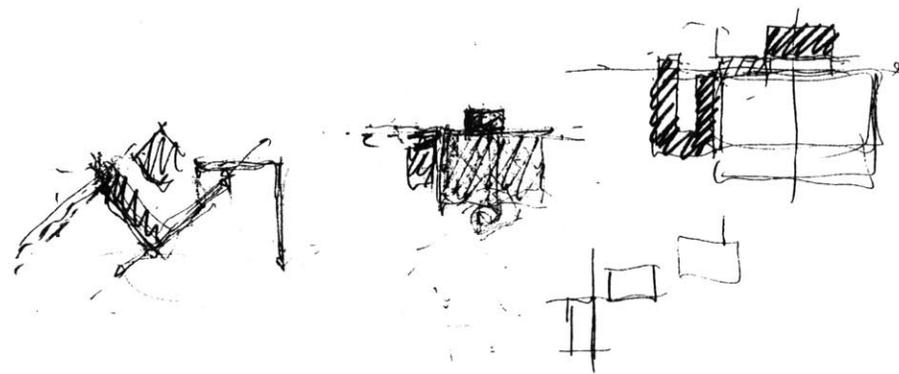
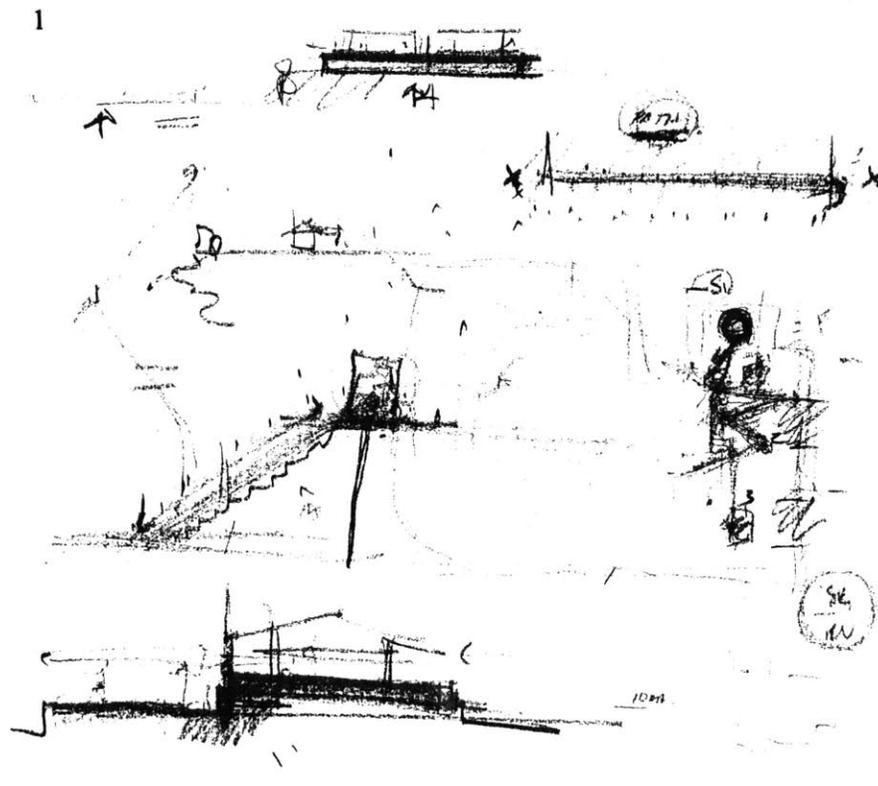
The 'problem-focused' strategy of the architects carries implications of the 'wicked' problem. Because design problems can never be completely described and therefore never susceptible to a complete analysis, it seems reasonable to suppose that designers would evolve a methodology which does not depend on the completion of problem's analysis before synthesis can begin. Thus, the designers' inclination to first propose a plausible solution is quite appropriate to their ill-structured problems.

Lawson's experiment suggests that, though the process may be subconscious, architects develop their own ways of solving design problems in a kind of individual methodology. In this thesis, the focus was on the development of non-diagrammatic space from diagrammatic space. The architects of the late Korean temples, especially, must have developed spatial ways of thinking from earlier examples. More and more, they began to turn angles and axes to evolve complex organizations which satisfied the human desire for more spatial experience.

As Lawson pointed out, our way of solving problems is very much solution-

focused. Before deciding on the most reasonable solution, the designer should consider a variety of plausible solutions before judging on their appropriateness. The better solutions arise from knowledge, from personal experience, or from ancestral stores. Korean temples show the steady progress of architectural space derived from accumulated wisdom. The four Amitabha temples share strong ties, but if there had not been precedents from which to learn, the later, more spatial temples could not have been possible. Herein lies the value of knowledge acquired from history. In this last chapter, I will discuss and explain my own design for a crematorium, which I used as a vehicle of experimentation for my knowledge of later Korean temples.

In designing this crematorium, I had a certain assumptions and convictions of my own. The first was that the starting point of design could not be the knowledge per se that I derived from the history of Korean architecture. Instead, I believed that it should be something else. The 'prime generator' must be very subjective. The second conviction was the belief that, after establishing one's own prime generator, whatever it is, then acquired knowledge can be applied in the design process. The last assumption was that it is almost impossible to explain one's own design process exactly as it had been carried out, even though the designer tries desperately to delineate the process and thoughts used. I believe we cannot explain but only justify our designs with reasonable descriptions. Thus, I avoided describing the process as a sequential order, as if the design had been developed in a logical step-by-step procession. Instead, I tried to explain the parts I had given special attention and the actual experience the visitors might confront.



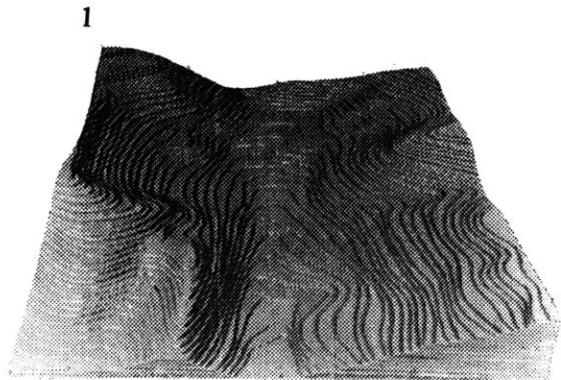
1. Early sketches.

6.2 Prime Generator

Literally speaking, a crematorium is a place where the dead are cremated. This word, “crematorium,” must evoke a wide range of emotions. Some people might feel fear, or others might recall loved ones who were cremated. To me, a crematorium is a place where the living bid farewell to the dead while confronting the meaning of death in life. The main idea I established as a prime generator was that the crematorium is in the vicinity of two worlds: that of the secular and that of the divinity. Thus, my main concern was how to relate the two worlds so that the crematorium carries more meaning. From the beginning, I imagined two different spaces through which to navigate while experiencing different sentiments.

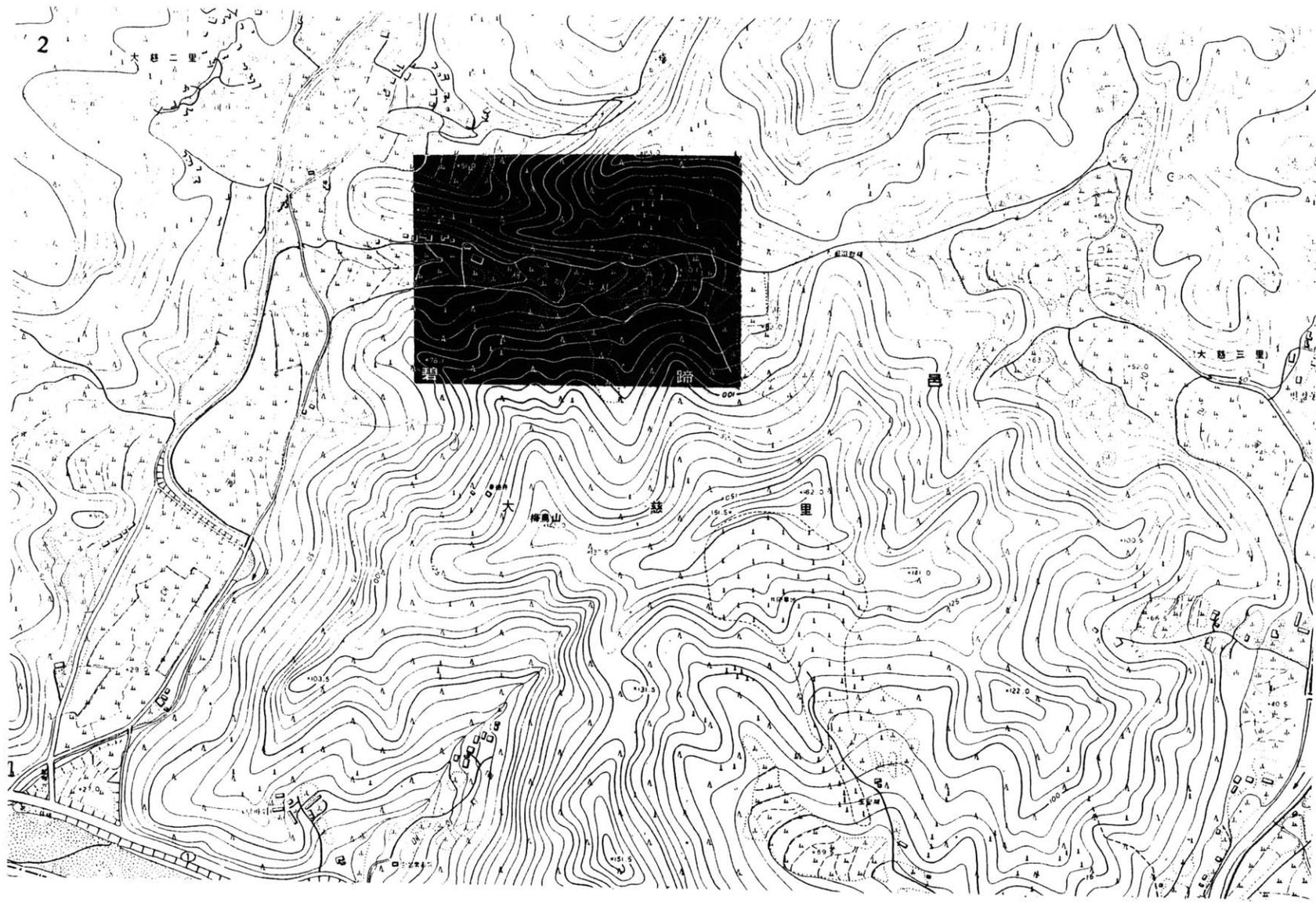
6.3 Site

It seemed to be more reasonable to select a site in Korea. During my visit, I chose a small valley surrounded by woods located in the suburban area of Seoul. While designing, I focused attention on certain points of the site and later connected them to form guidelines that located spaces and structures.



1. Site model.

2. Site. Byukjae Gun, Daeja Lee, Saekasi Gol.



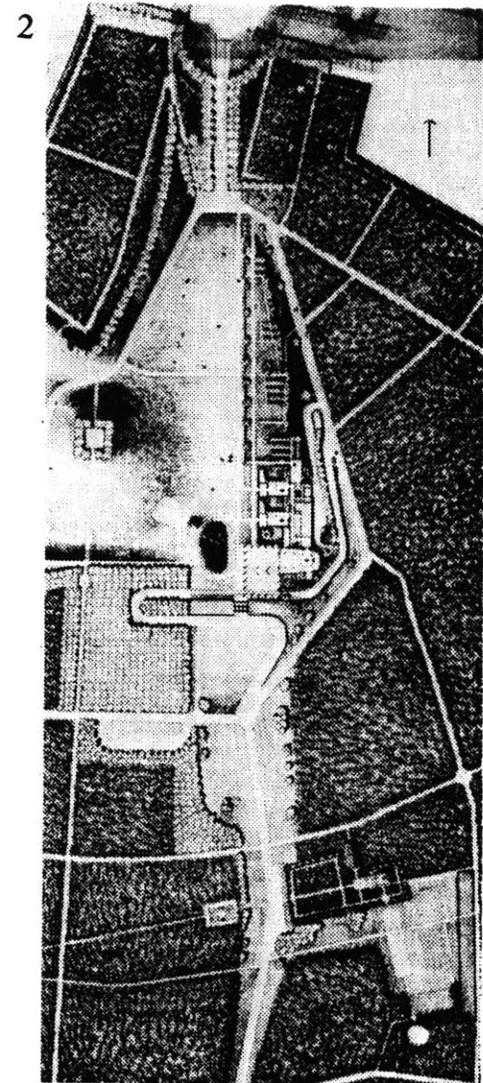
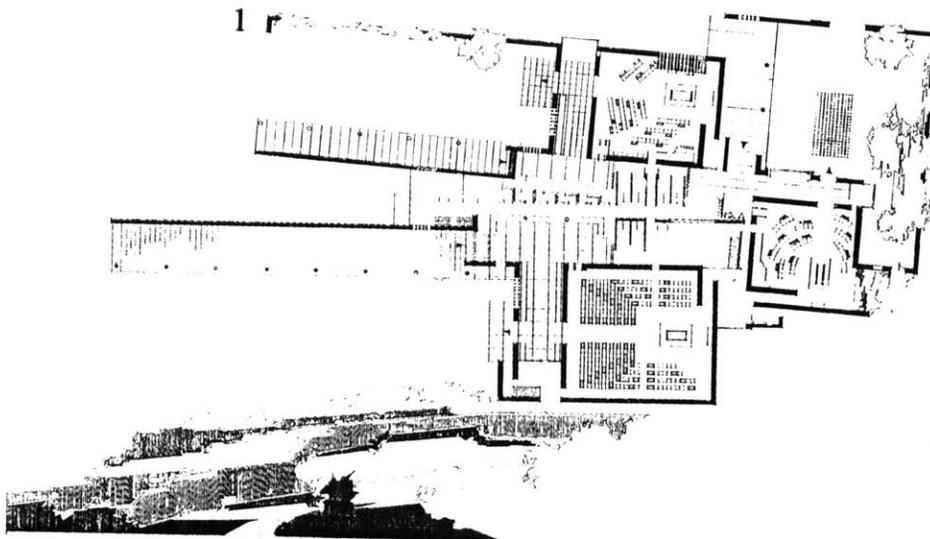
6.4 Program

The program is not for a municipal or state crematorium, which would have many furnaces. Due to the strong influence of Confucianism in Korea, most people want to be buried instead of cremated so that their descendants can take care of them. As a result, most crematoriums have been destined to be built for the poor or those who do not leave behind successors. Most Korean crematoriums have more than ten furnaces. These cannot be regarded as places where funeral services are faithfully served. Rather, they are third-class waiting rooms where gloomy and fatigued people stand faceless. Thus, my intention was to design a place where a solemn ceremony can occur.

In developing my own program, the European crematoriums by Alto and Asplund were good references. They have a few furnaces and accompanying chapels. The body is carried through the underground passage and lifted up into the chapel space by elevator. My program includes the following: one Christian chapel and one Buddhist chapel, an underground serviceway and underground elevators, mechanical rooms and furnaces, space for the delivery of urns, a waiting space, a kind of anteroom and inner court before the entrance to the chapels, a contemplation space, and supporting facilities such as offices, storage, and toilets.

1. Alvar Aalto's crematorium. plan.

2. Gunnar Asplund's crematorium, site plan.



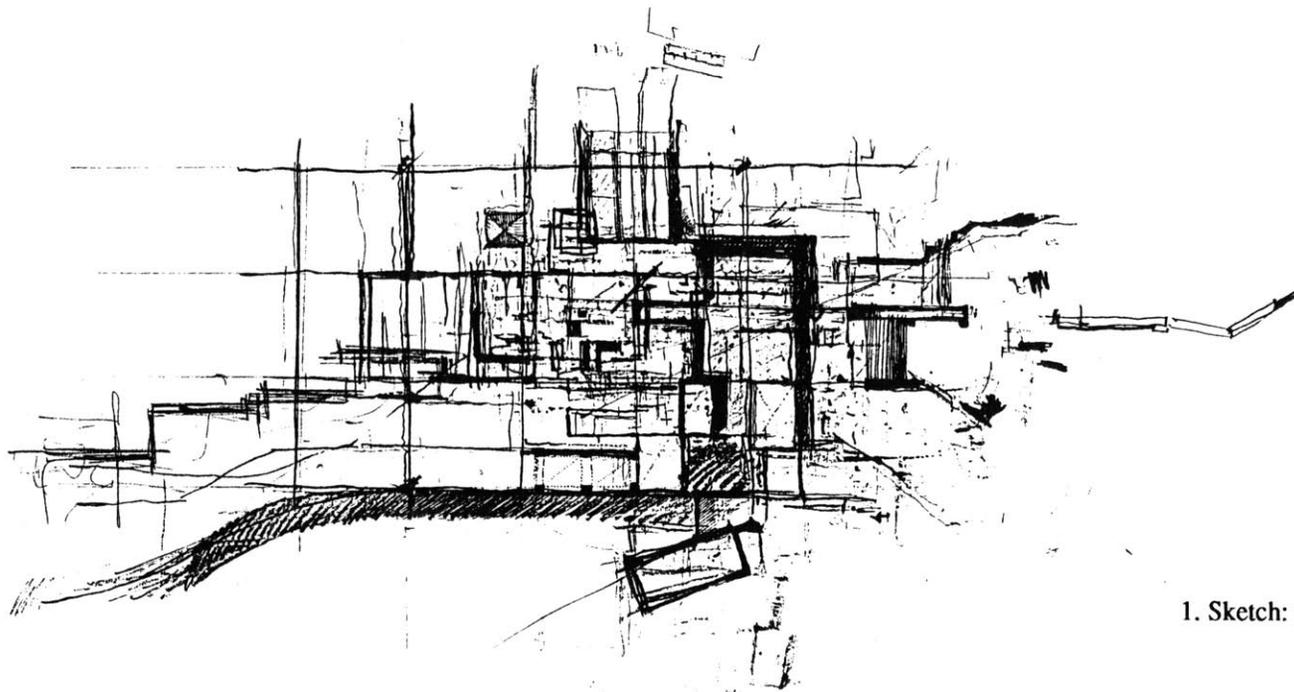
6.5 Design issues

These issues are mostly derived from the examples of Korean spaces illustrated in the previous chapters and act as guide lines in designing the crematorium. They could be very abstract expressions. Nevertheless, with the examples of the cases I studied, these were very clear ideas to me.

How to connect or separate spaces in section and in plan

How to guide movements between axes.

How to turn axes



1. Sketch: early stage.

How to separate or merge axes

Where to locate structure in relationship to the whole space

How to engage nature and landscape

How to structure space to lead people to proceed very naturally

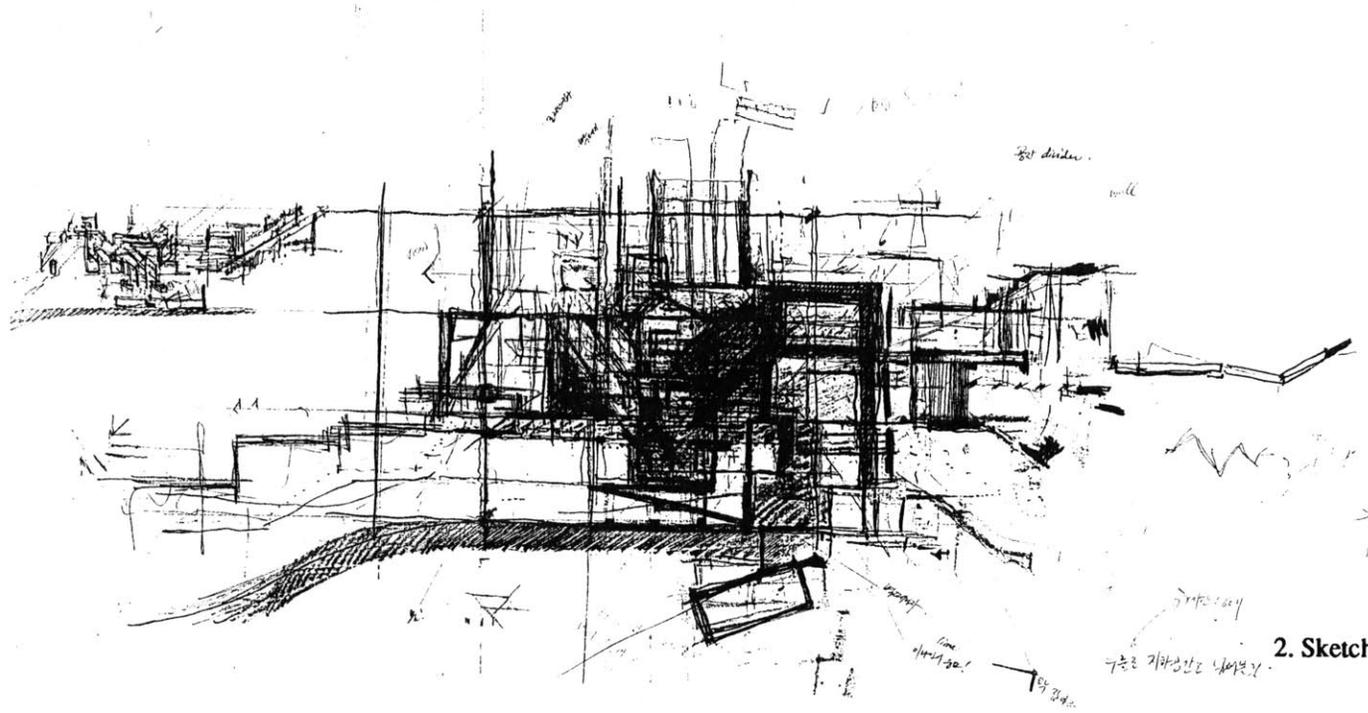
How to create a territory or containment

How to create such meaningful structure as the well of Sooduk Temple.

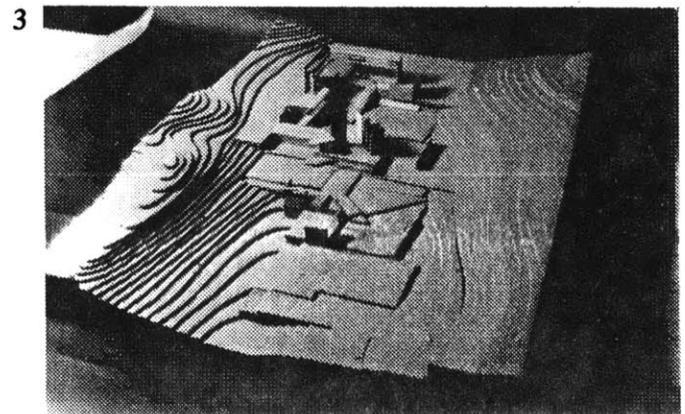
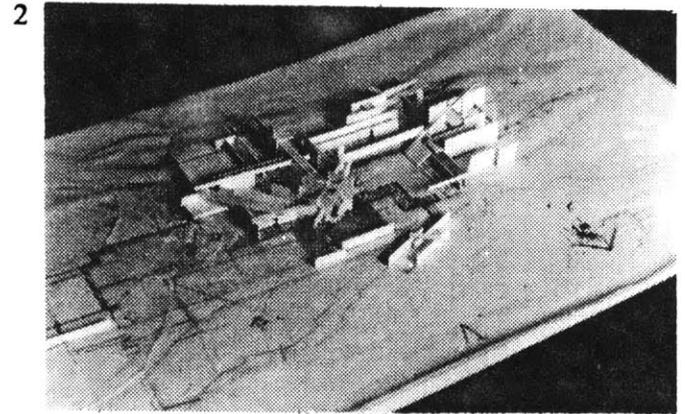
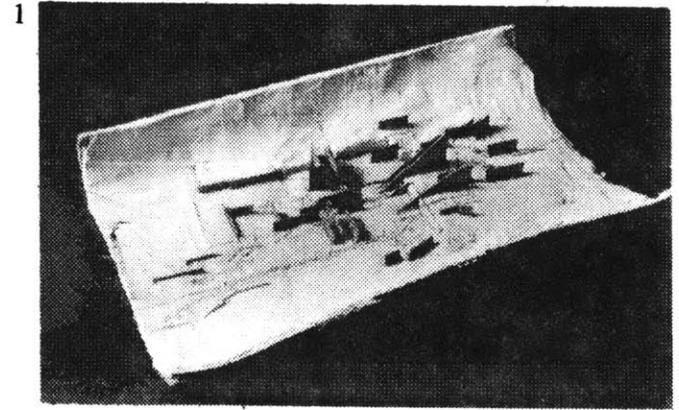
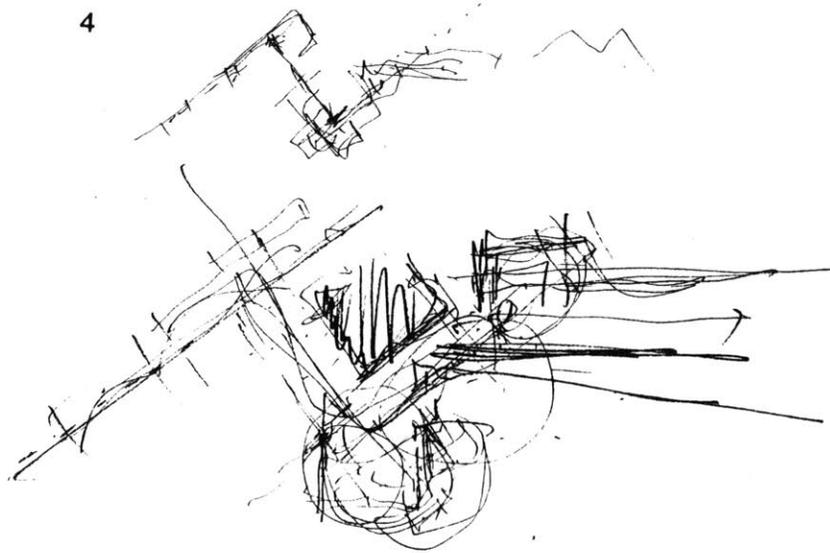
How to use the polar system of coordinates as a human-oriented way of thinking

How to create mutual dimensional relationships

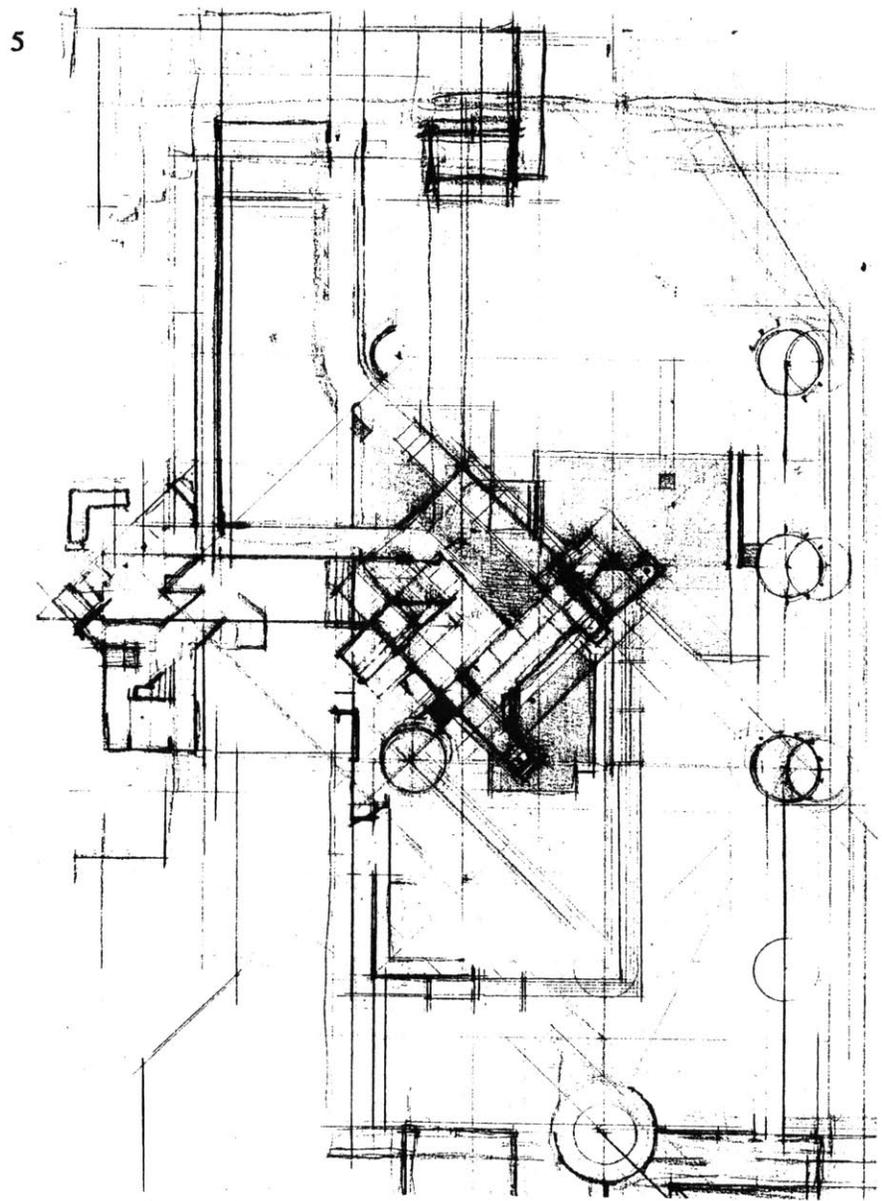
How to find a systematic way of organizing space as in Dokrak House



2. Sketch: middle stage.



1. Model: phase 1
2. Model: phase 2
3. Model: phase 3
4. Sketch showing structure and movement.
5. Later drawing.



1. Second floor plan: ramps which engage people in nature.



6.6 Spatial experience

The following descriptions written in *italics* include the experience of visitors and the following plain text was intended to explain the meaning of each design action for the experience.

They arrive here in a deep abyss of sorrow.

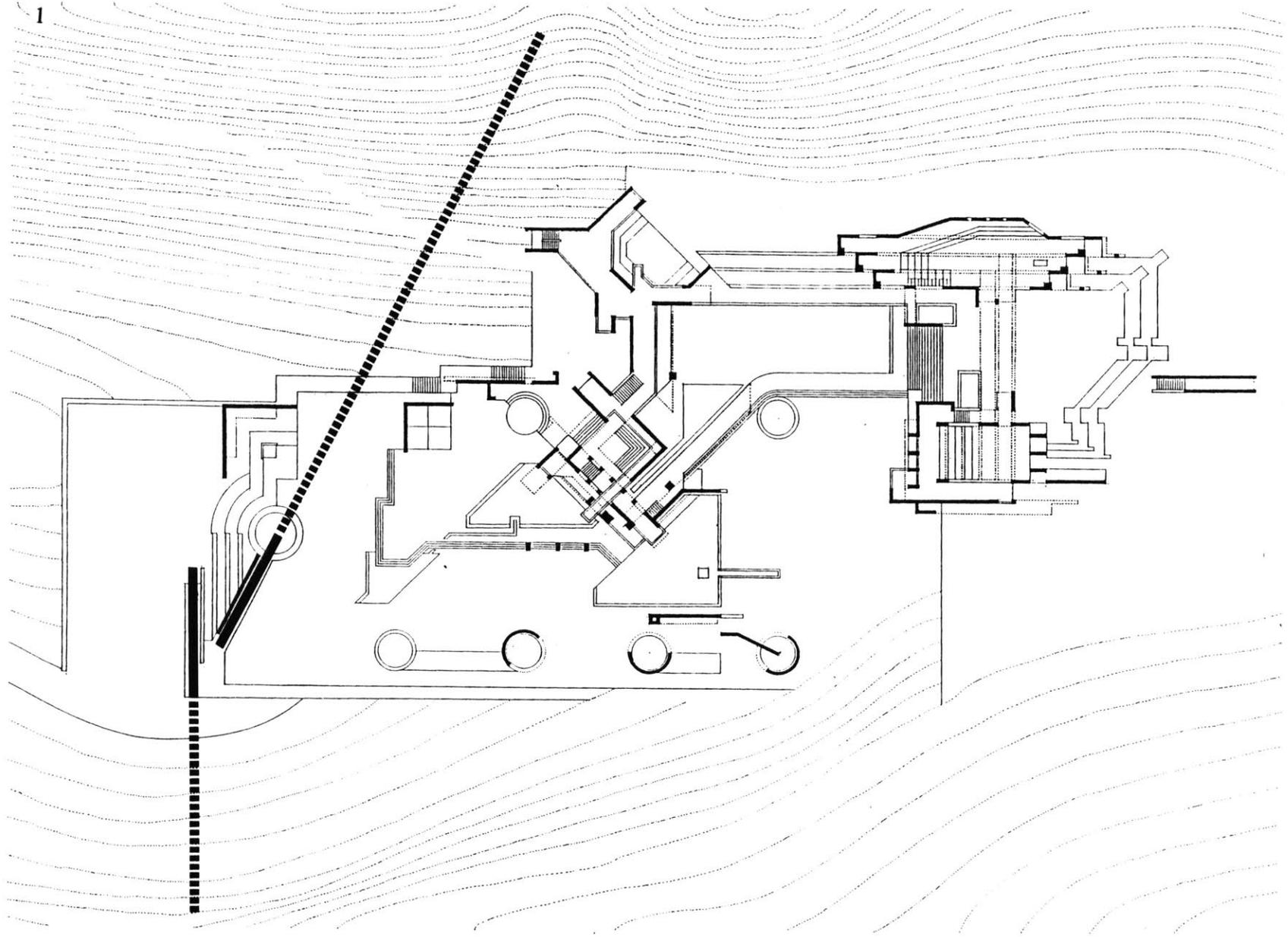
Along the ramp, they begin their last march for their loved one.

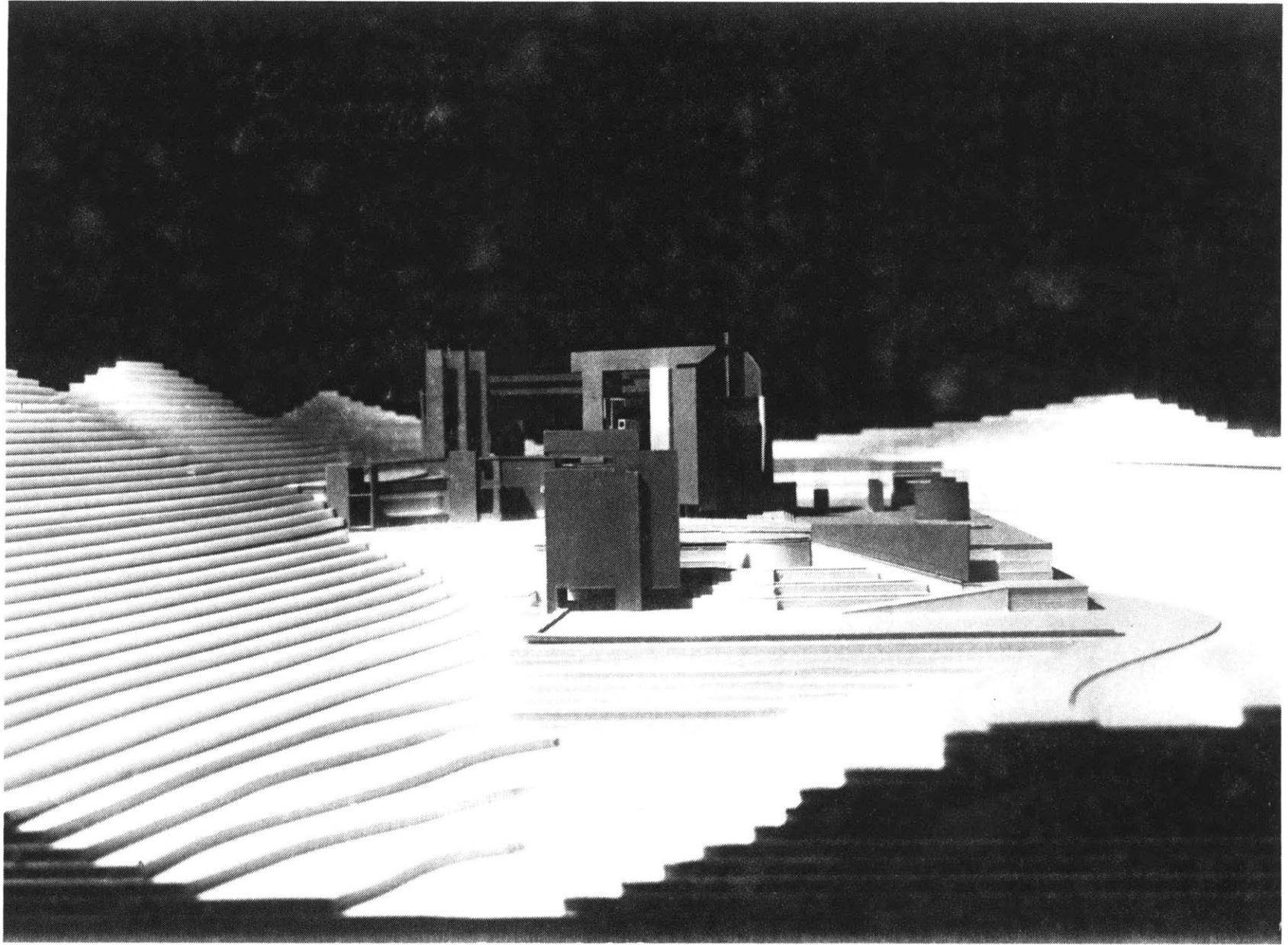
Along the ramp, what they see first is not merely the cold surface of concrete.

They see nature, as a prelude to this holy ceremony.

Their views are extended into the woods, and nature embraces them.

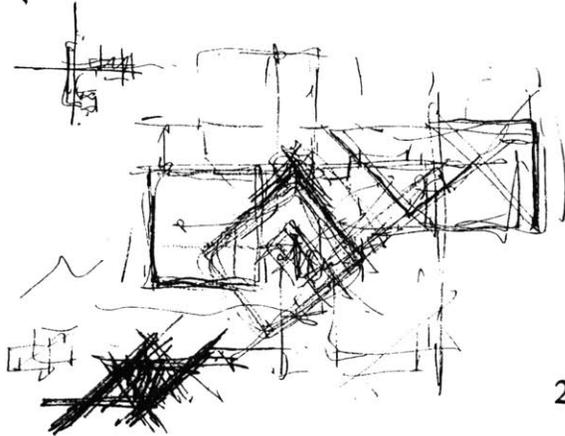
The ramp in front of the parking space was designed to provide visitors a chance to engage in nature. Their view is fixed on the woods as they ascend the ramps. The motivation behind these ramps arose from a potent question: why the removal of the walls surrounding the inner courts of early Korean temples? Did the opening up of the inner spaces signify a spatial engagement with nature, a dissolving into the landscape?





*At the end of the ramp, they see a structure in front of them.
Also, they see is space surrounding the structure.
Then, they realize that they are on the main axis of the space they
will navigate.
The sky is blue and the grass is green.*

I tried to apply a unique way of structuring space in this project. Form was my secondary concern. As in Dokrak House, where a kind of 'space grid' system was used, a systematic way of structuring space was conceived from the beginning stage of design. In my own grid system, each point possesses its own spatial meanings. Also, movement between lines and points in the grid has its meanings, and each structure was located in relation to the grid. The dimensions of spaces were generated from this basic grid system. Thus, an organic body of space as a whole was created.



2

1. Model: view from the road.
2. Sketch of spatial structure.

Second Floor Plan.

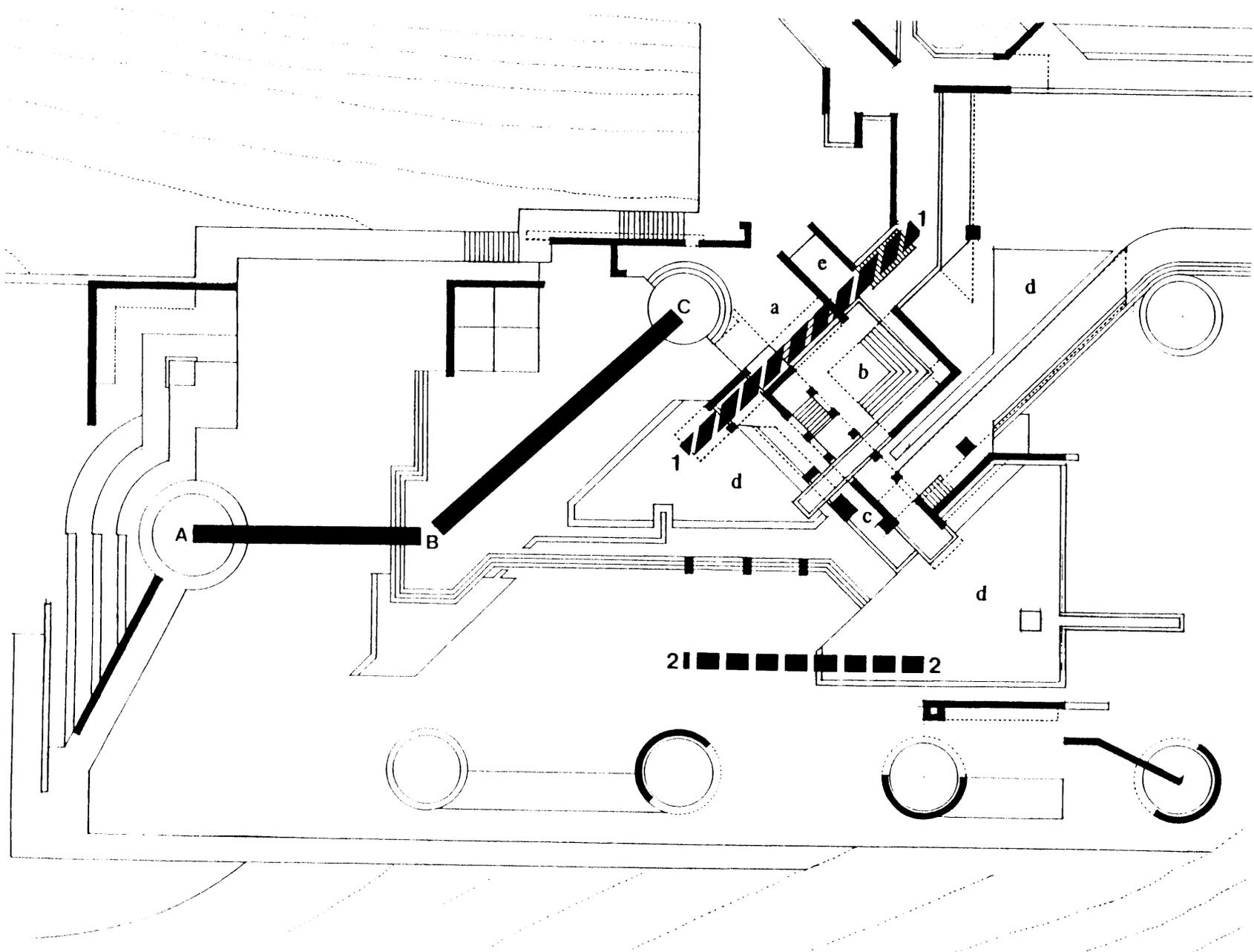
A-B-C. Movement line.

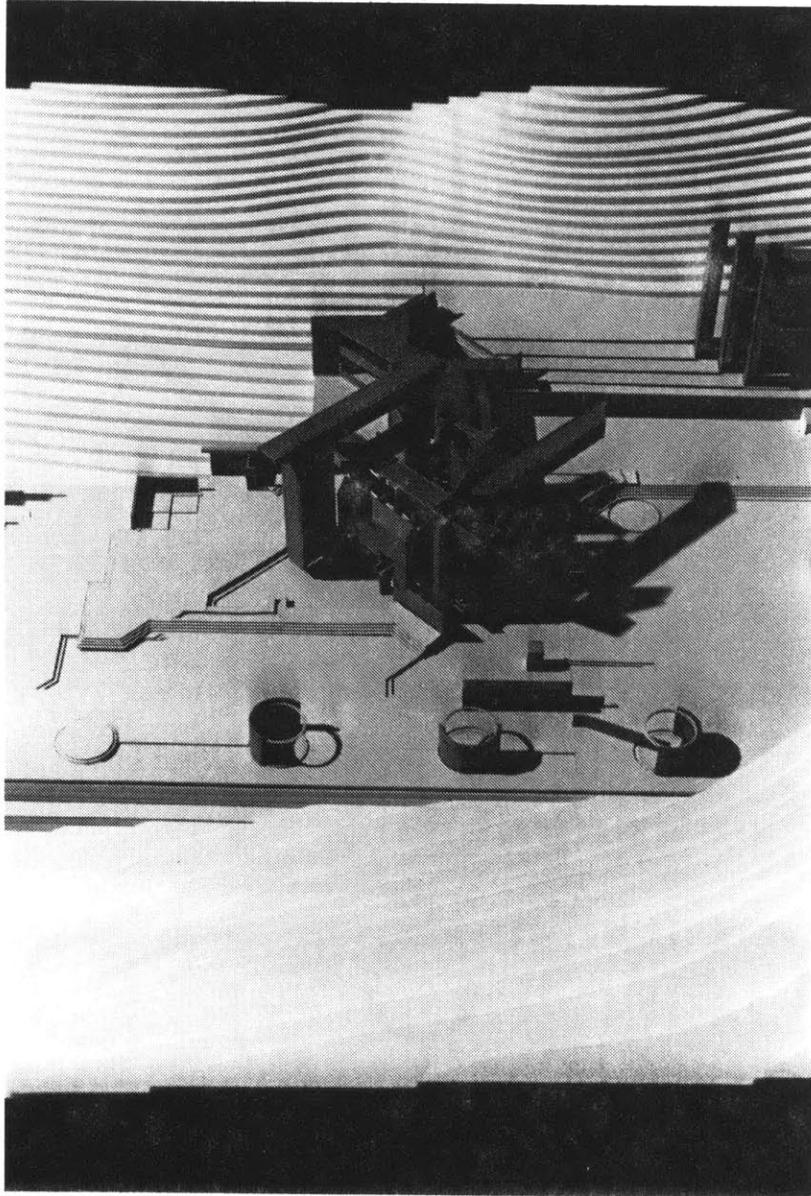
1-1. One diagonal unit in the space grid system.

2-2. One unit in the space grid system.

dimension of movement B-C = dimension of structure 1-1

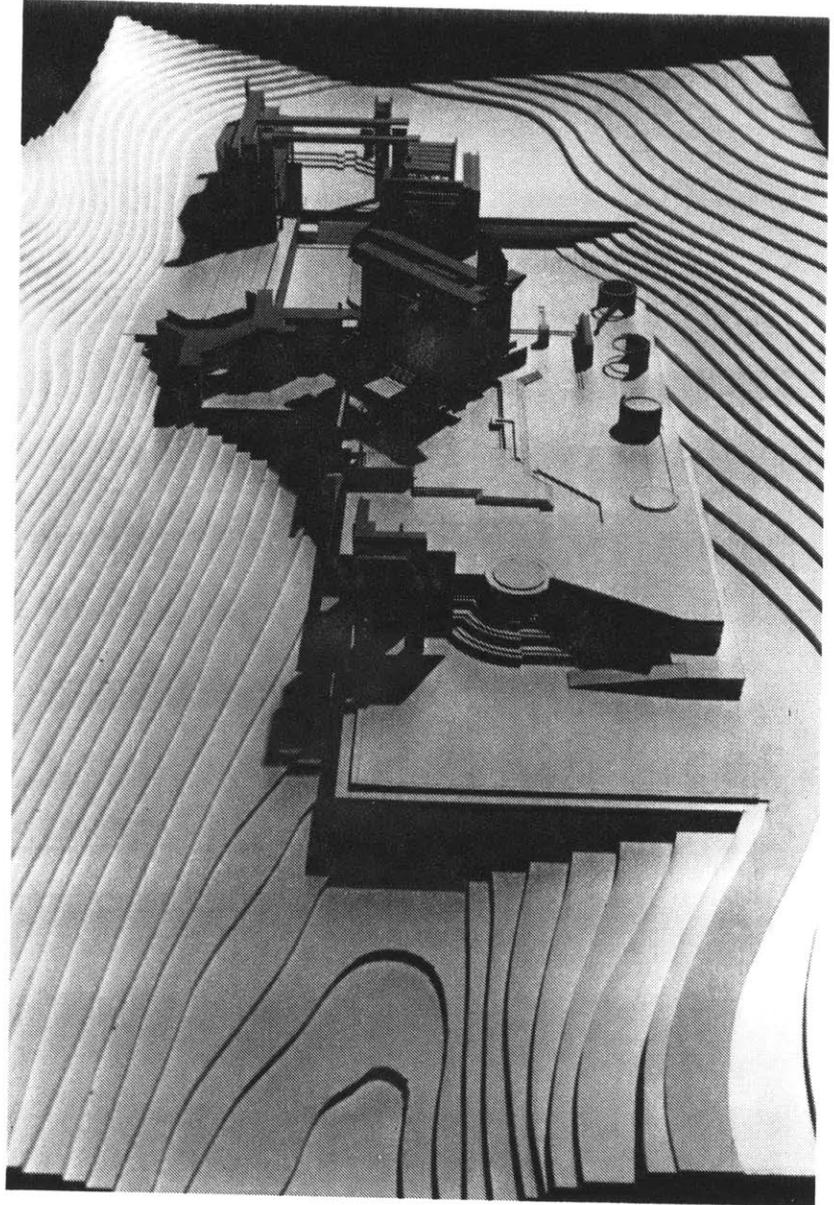
- a. entrance.**
- b. lobby.**
- c. contemplation space.**
- d. water.**
- e. office.**

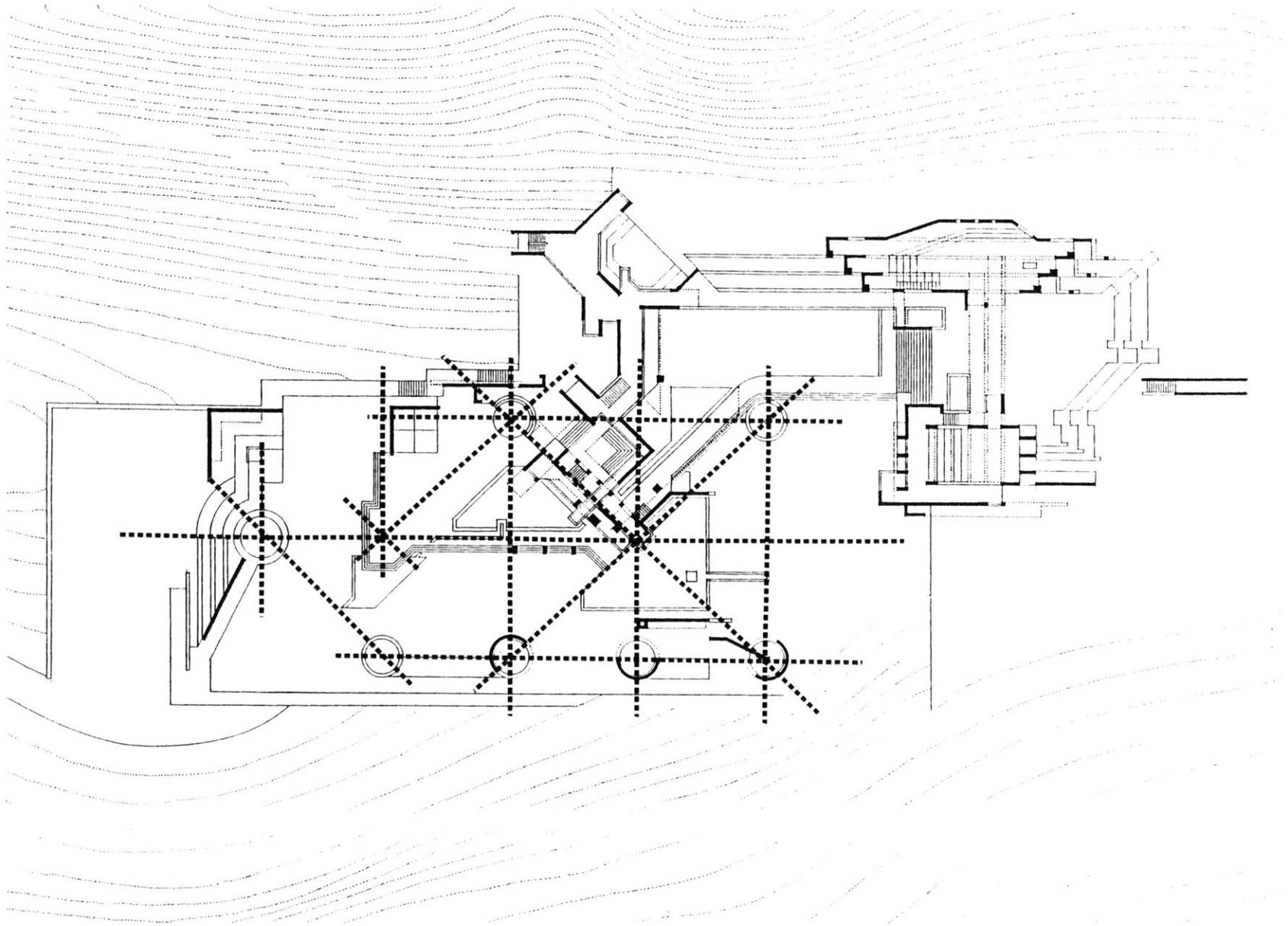




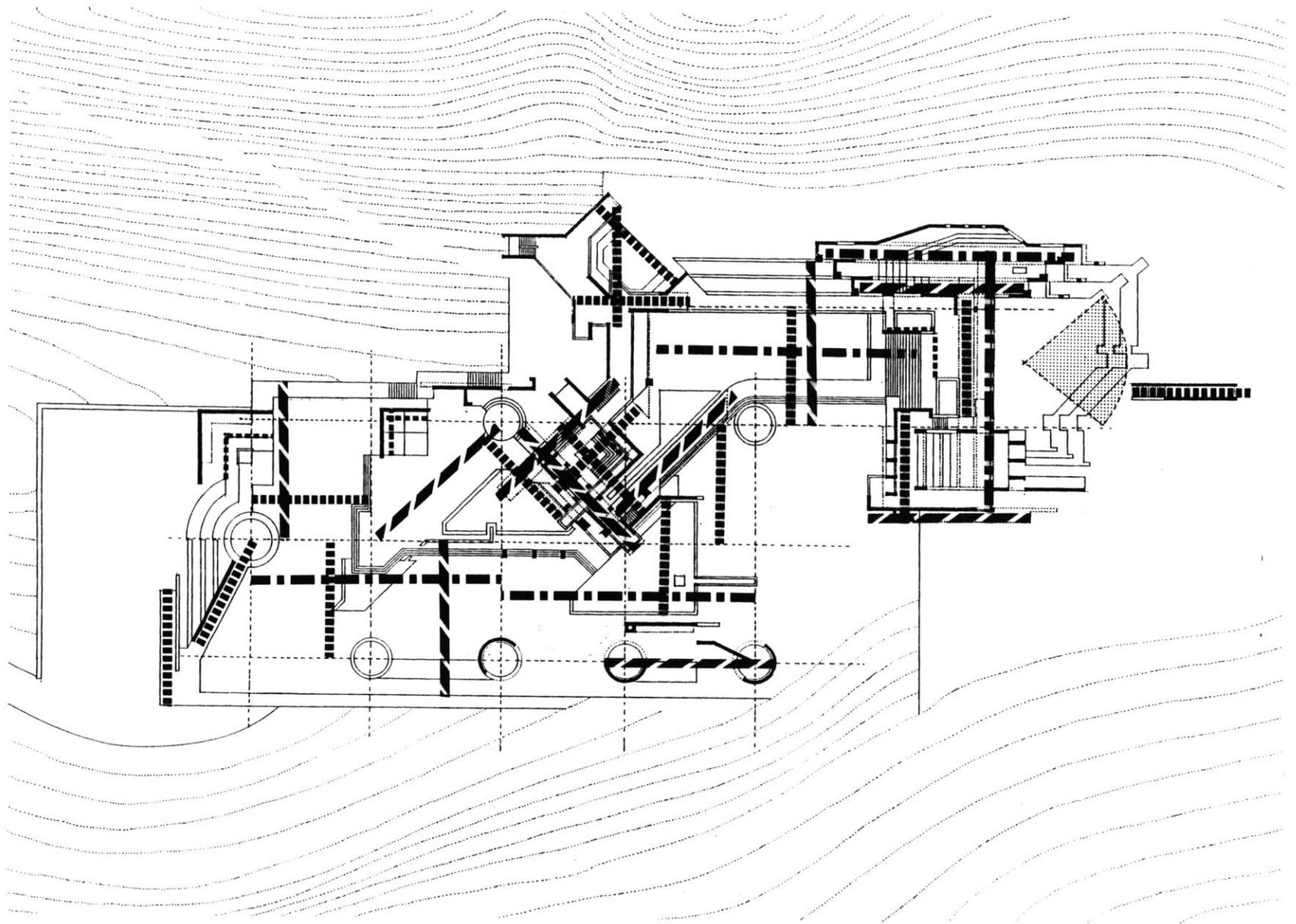
1. Model which shows the lobby and contemplation space.

2. model which shows the whole site.

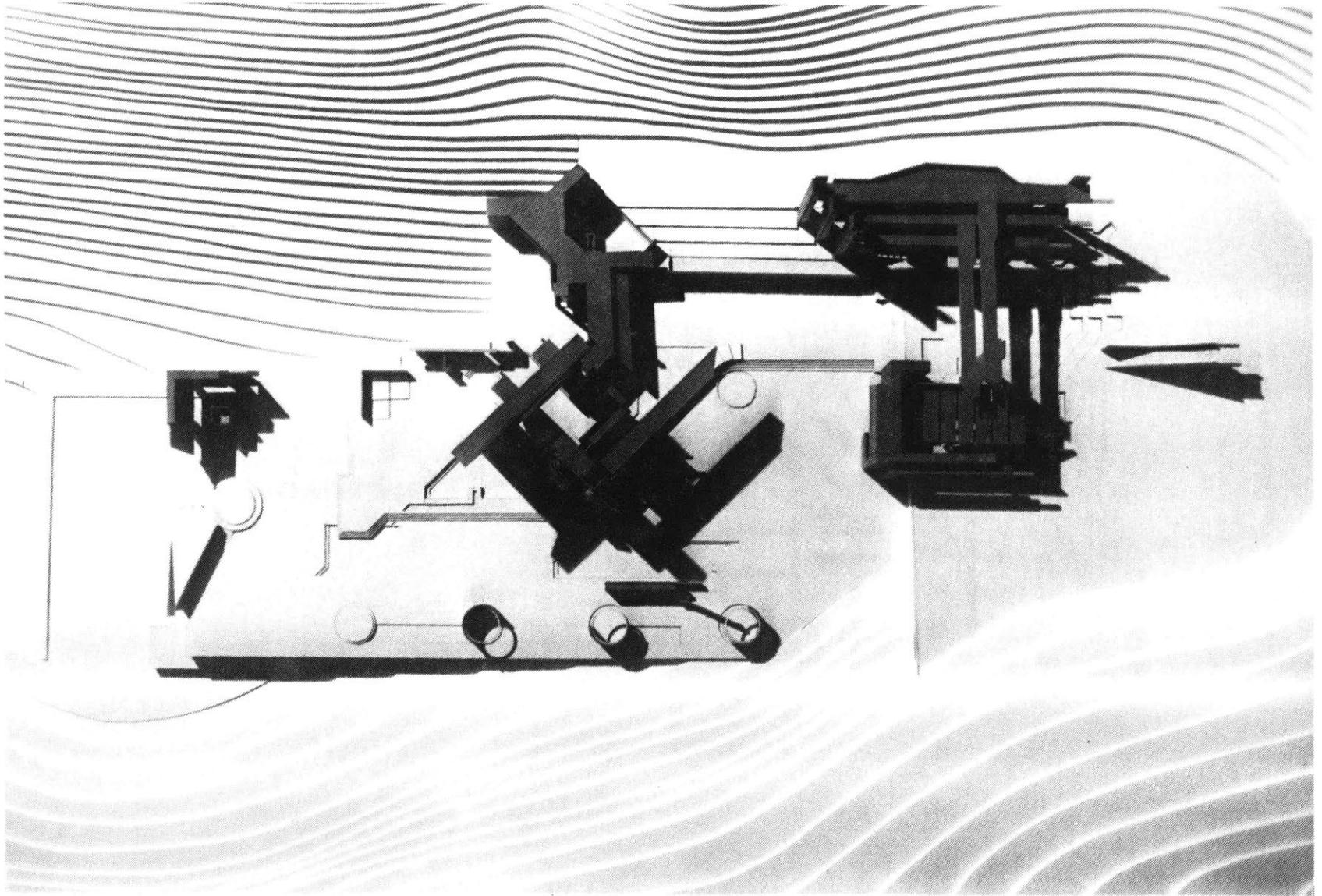




1. Space grid system.



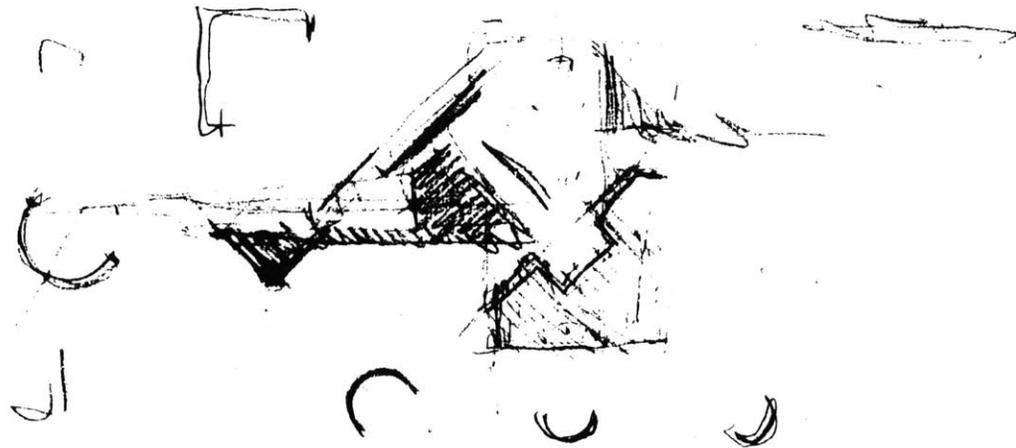
2. Dimensional study.



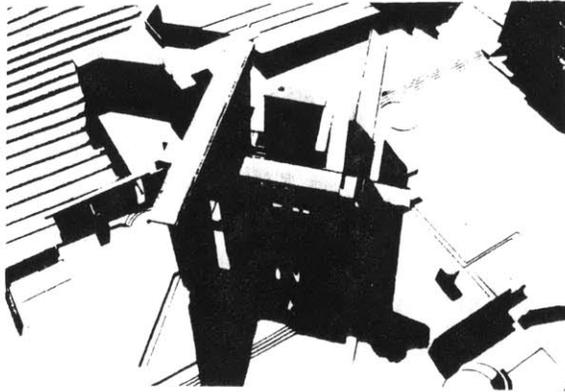
A-B-C

*They extend their first step towards the space and the structure.
They do know their way .
They do not hesitate to decide the right direction.
While walking through the space, they realize the meanings of
structure and space.*

The navigation through space was strongly guided by such form and space as walls, water stream, steps, and the direction of the buildings--as in the case of Sooduk Temple. In this sense, the structure of the building encompasses more than sculptural form. For example, the distance of the diagonal movement from one point to another in the space grid system creates a natural diagonal structure along the movement. Thus, each structure comes to have meaning in relation to movement, namely in dimensions.



1. Sketch: navigation through space.



C-D-E-H C-D-F-G

They enter the space of tranquility and darkness.

It is surrounded by calm waters.

Light reflected from the water creates a heavenly space.

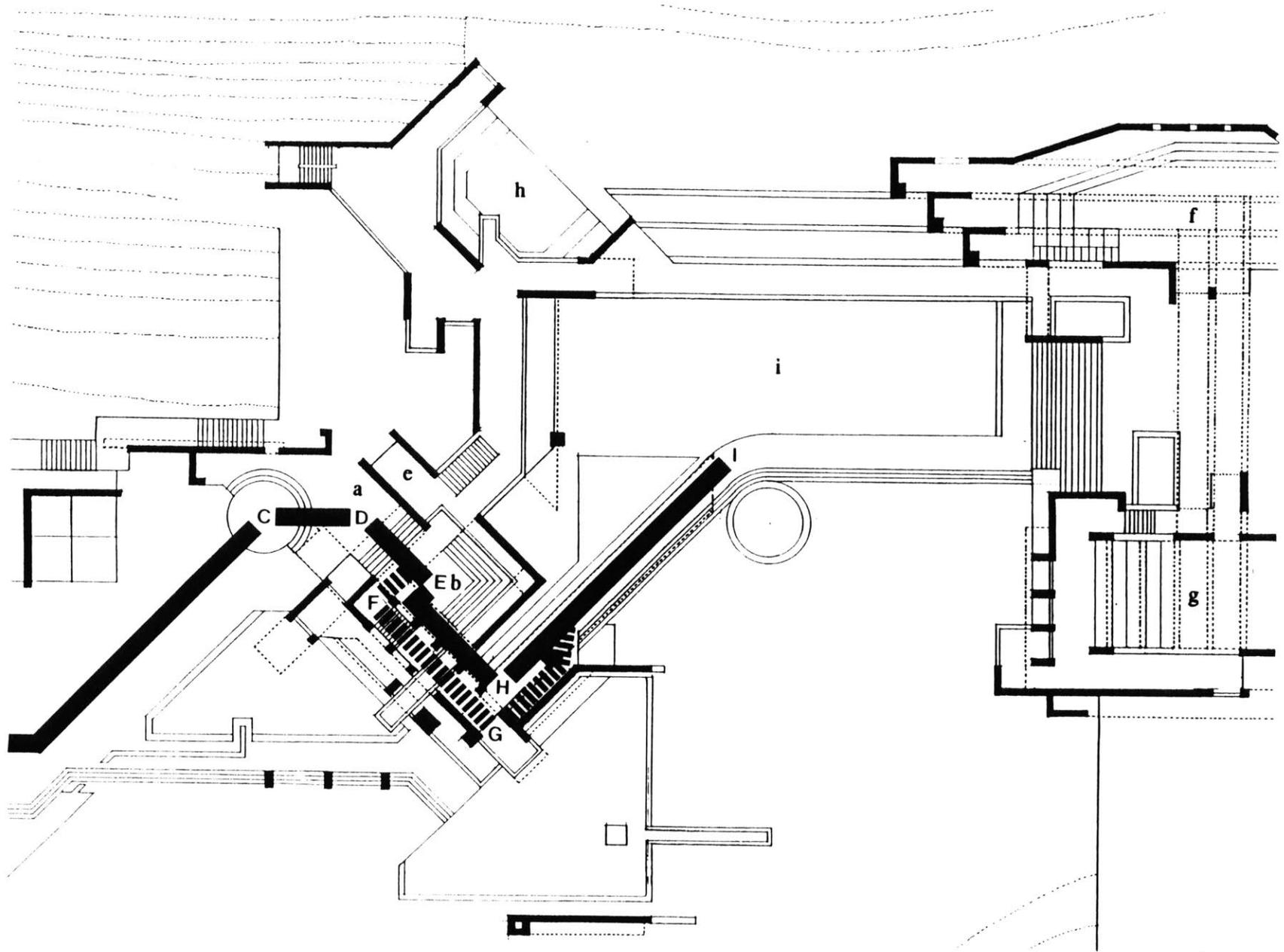
Also, the space is generated by light filtered through the structures.

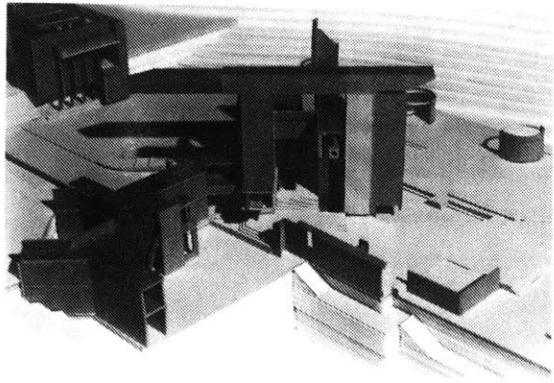
They stay in this space for a while.

Some might go down to the water to

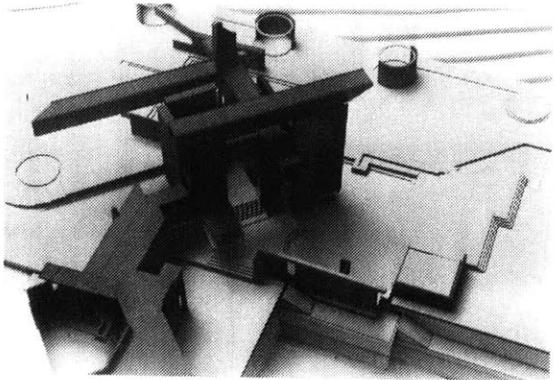
Second Floor Plan.

- a. entrance.
- b. lobby.
- c. contemplation space.
- d. water.
- e. office.
- f. Christian chapel.
- g. Buddhist chapel.
- h. waiting space.
- i. court.

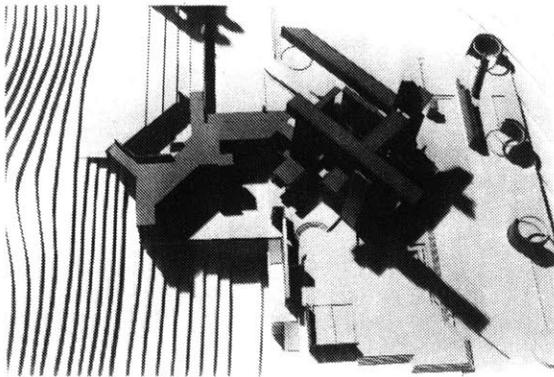




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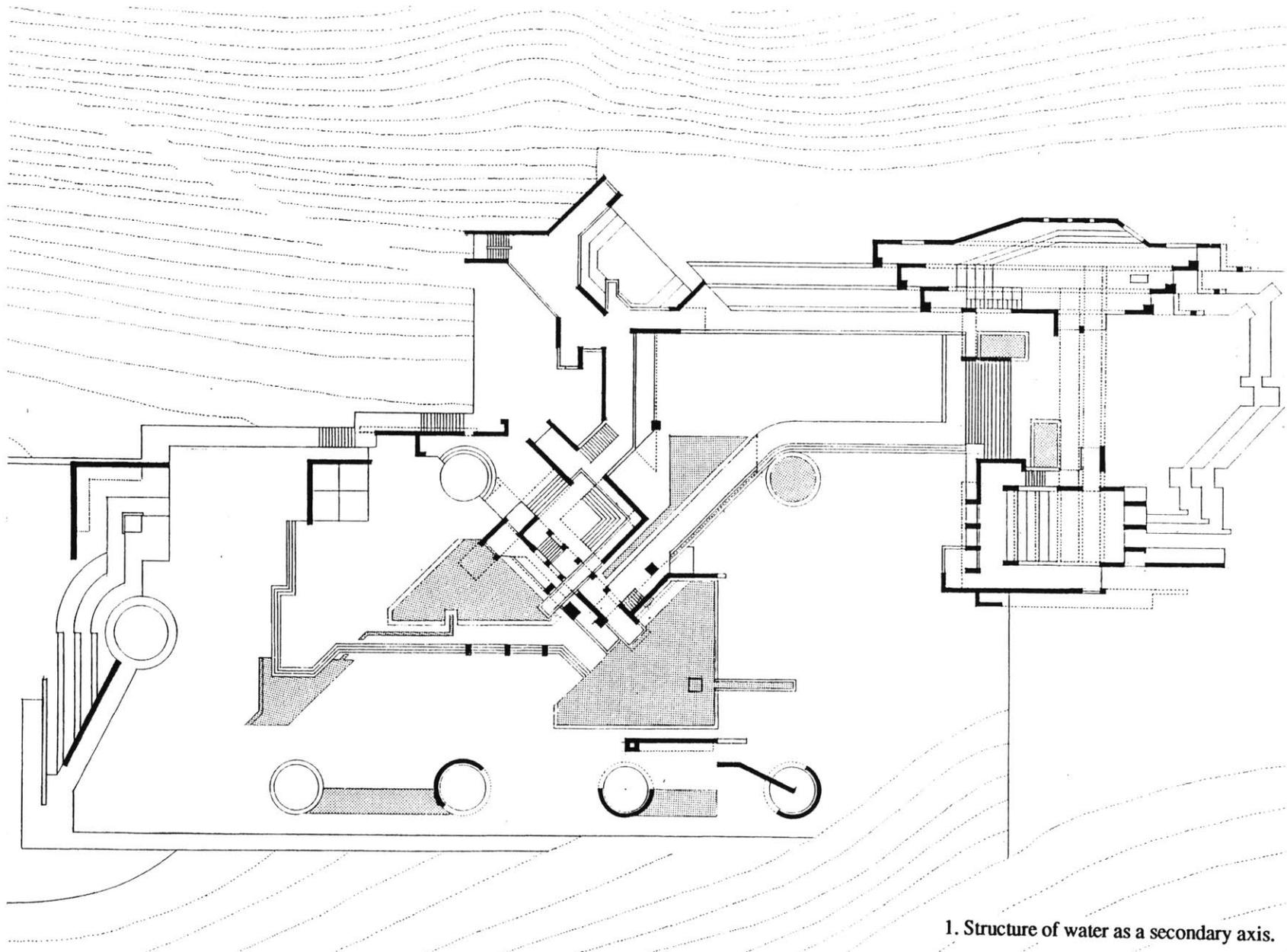


3

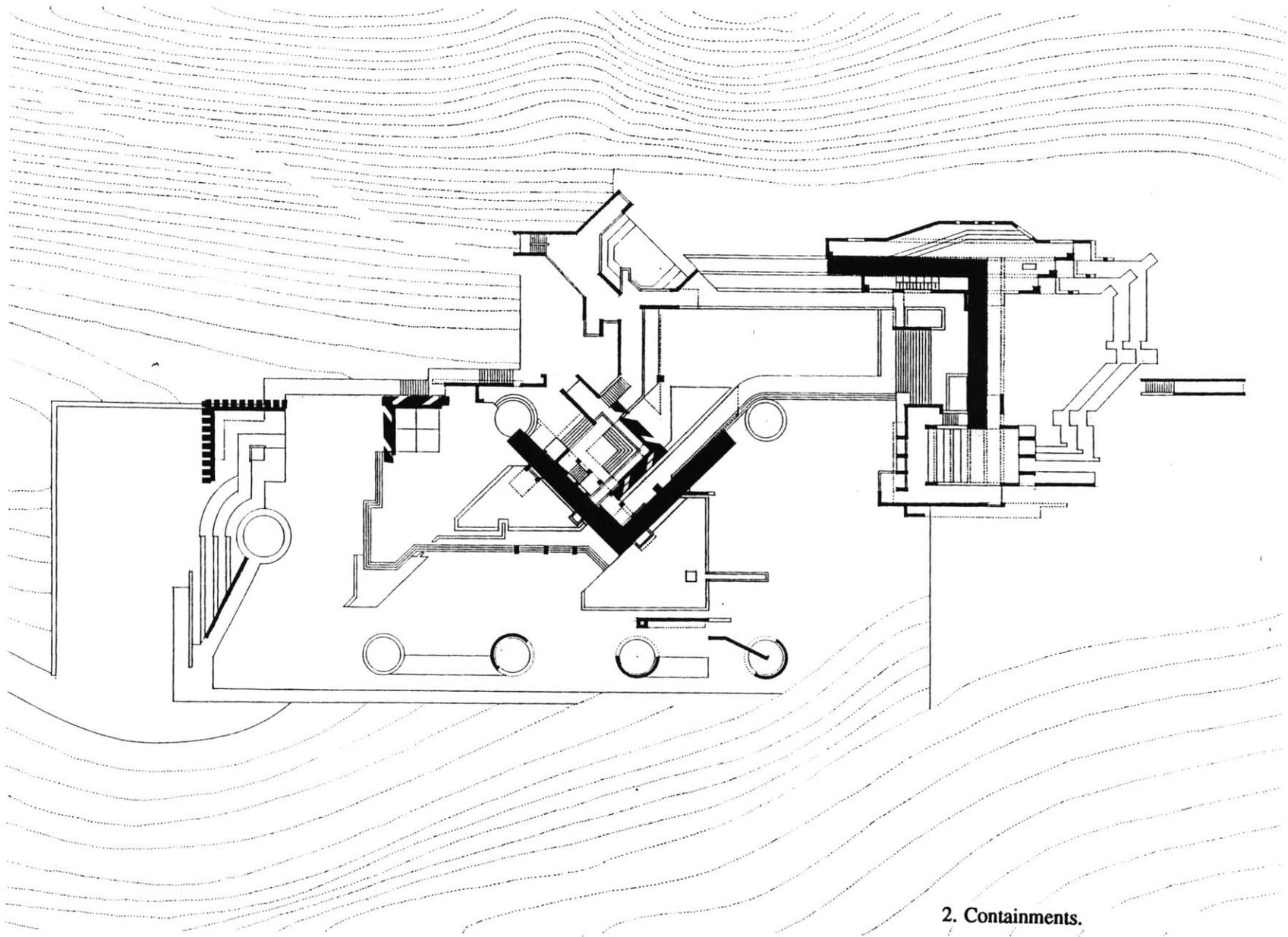
In this particular project, a special mission was assigned to the water, which acts as a guide with respect to movement: stop, move around, or go. Also, water was treated as another axis to direct the performance of space and form. On the other hand, an abstract metaphor was given to the water: that of the lapse of time representing the birth and death of men.

Another concern was to provide meaningful containments or territories, as in Sooduk and Whaum Temples. The diagrams here show how the basic containments are related and designed. Each containment plays a role in the whole spatial structure, affecting the other containments, in turn.

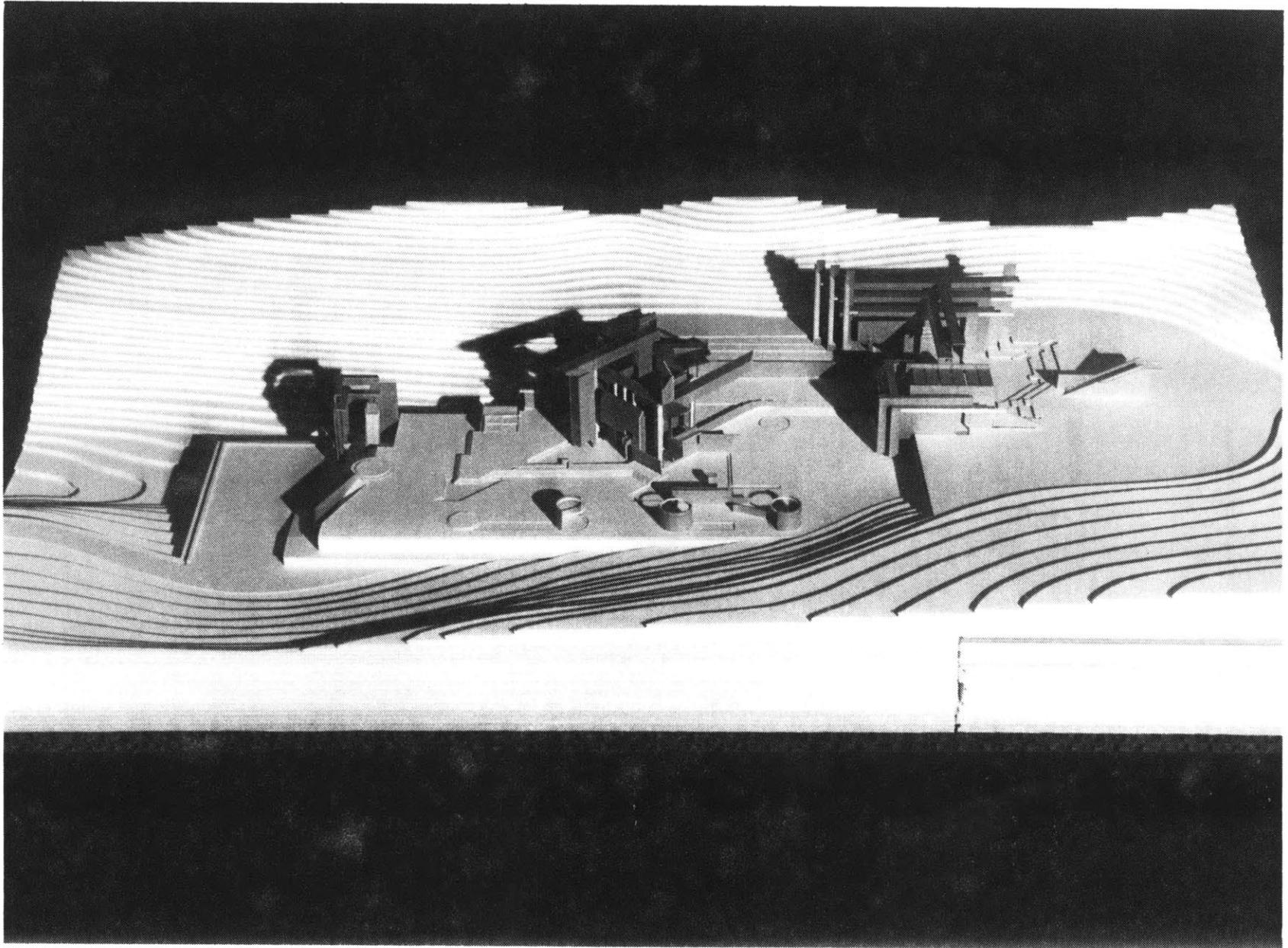
1. Model showing the main entrance
2. Model showing the main entrance.
3. Model showing the lobby and waiting space.



1. Structure of water as a secondary axis.



2. Containments.



Pausing at the water's edge, they realize their stance in the midst of space.

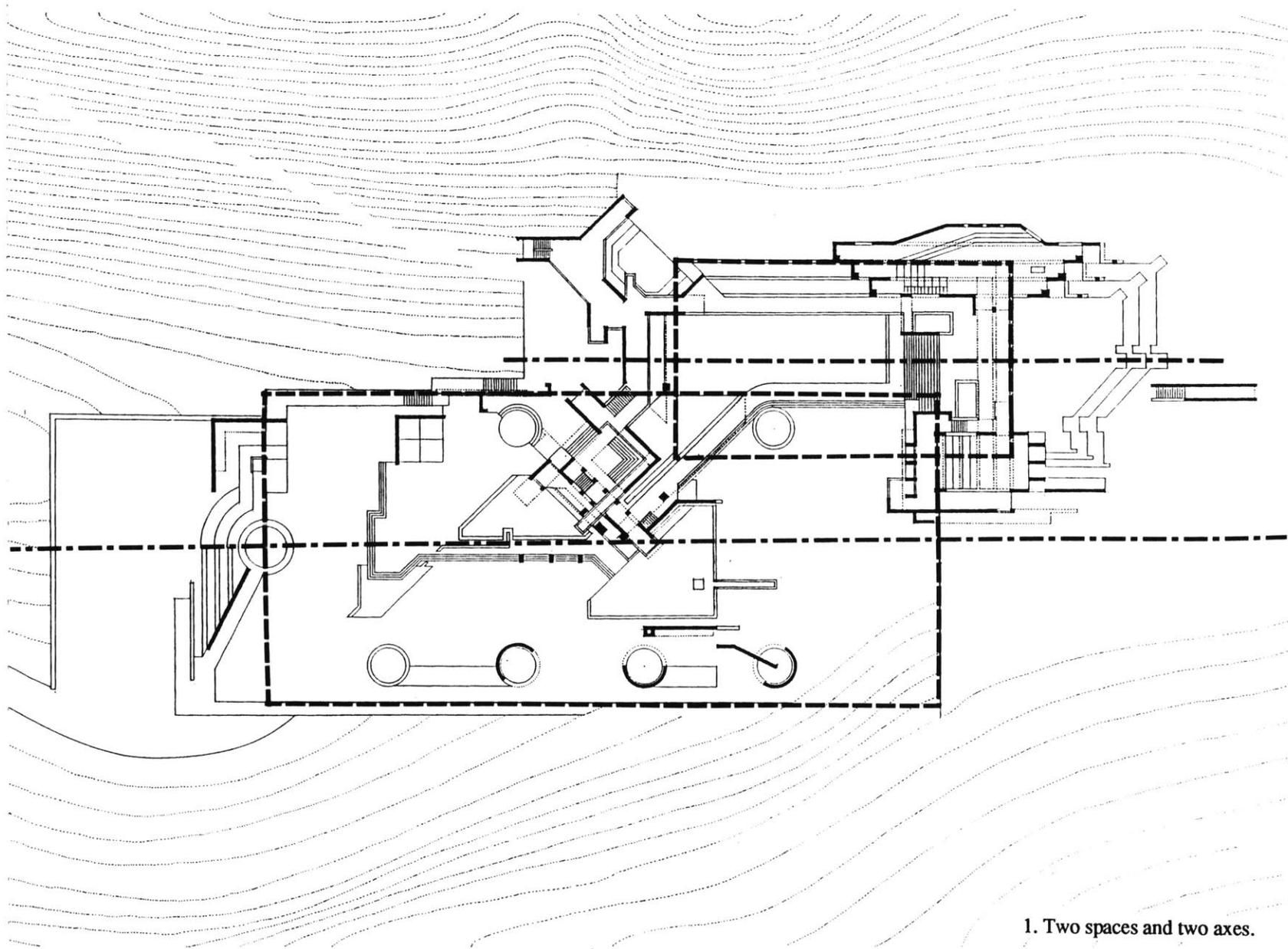
Here, another sharp turn reverses the previous one.

They see another space, another structure.

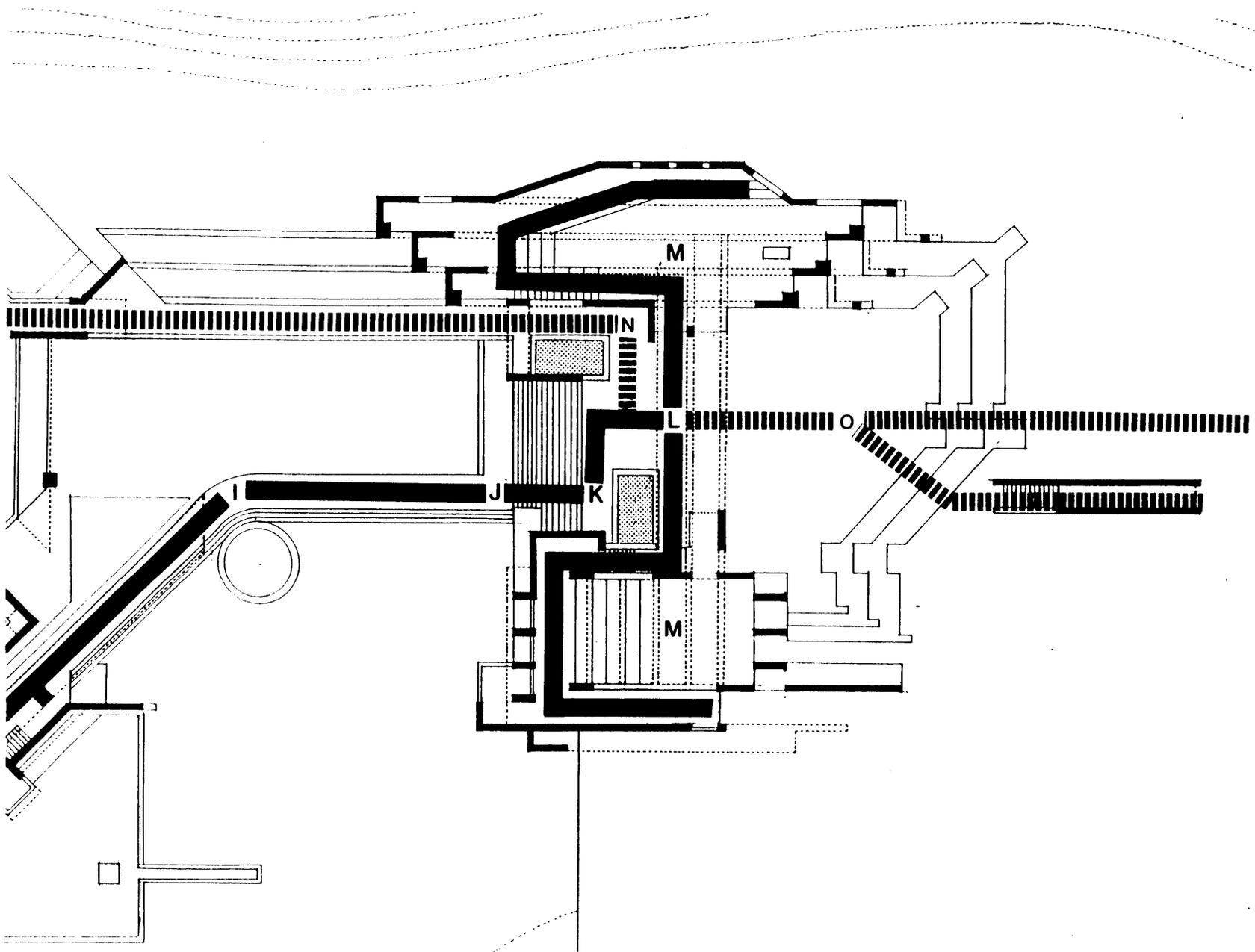
They note the imminence of yet another space , distinct from the one that now holds them.

Axis was a major issue of this design. The visitor's movement from one axis to another was carefully planned. Also, the act of departure from an axis and subsequent rejoining possesses significant meaning. Where to make people depart from or remerge with or turn from an axis was as critical an issue in this design as it had been in the later Korean temples and houses. Especially in this project, the turning points of movement were generated from the space grid system.

1. Picture showing the whole site along the valley.



1. Two spaces and two axes.



I-J

They finally reach the space of divinity where two chapels await: a Christian chapel and a Buddhist chapel.

They are met by a big open gate formed by the two chapels.

Through the gate, they open eyes upon the sky.

The stairway beckons.

As with an Amitabha temple, the second space has its own axis and lies adjacent to the first one. It is well defined by the level change. The visitor is supposed to move through the second space but, before ascending the big stairway, moves apart from the main axis of the second space, namely on the edge of the space. They have not reached the climax of their journey yet.

The 45 degree turn before entering the second space reminds me of that of Boosuk Temple in which a similar turn was made before entering the major space.

First Floor Plan.

a. furnaces.

e. toilet.

b. storage.

f. waiting space.

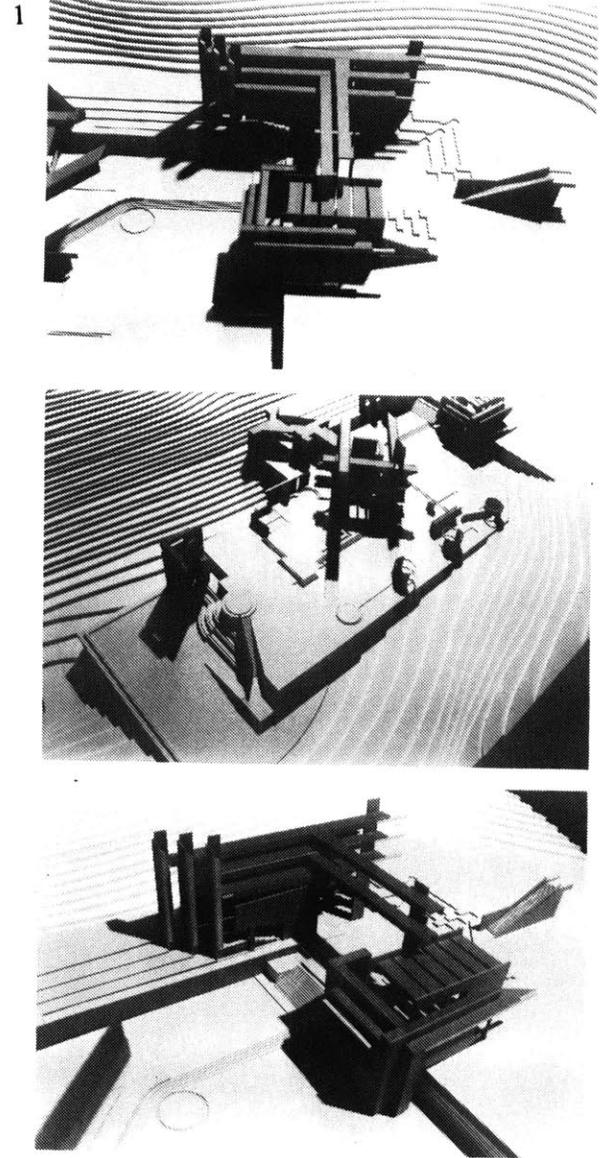
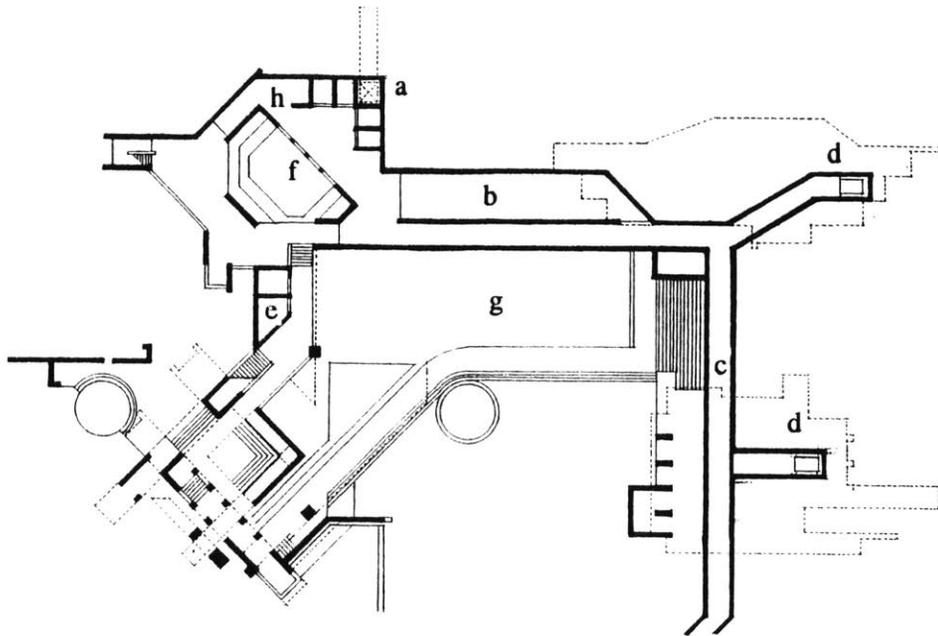
c. underground passageway.

g. courtyard.

d. elevator.

h. delivery of urn.

1. Model of the two chapels: Christian chapel and Buddhist chapel.



They rise up the stairway finally.

They see first not the landscape spreading to the summit of the valley but a small pond.

They lower, then raise , their heads--a short lapse of time.

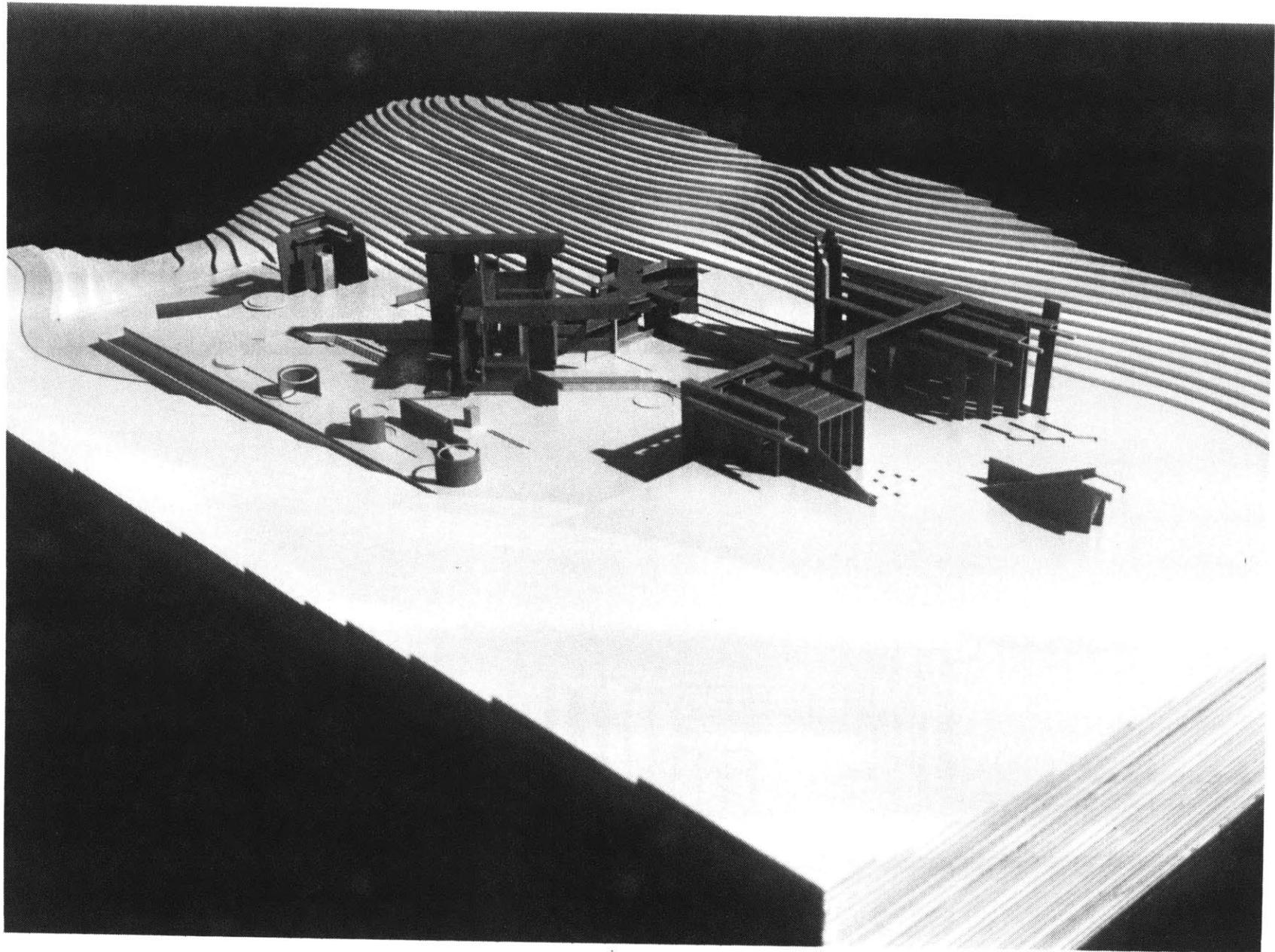
And they take in nature as they merge into the main axis of the space.

The climax of their journey at last!!!

The small pond beside the Buddhist chapel presents an obstacle like the well of Sooduk Temple. But this small presence can increase the emotional feelings of confronting nature. Also, the two small ponds between the two chapels were devised to direct movement. Along the pond, people merge naturally into the second main axis.

At this place, a 'critical' point based on the polar system of coordinates has been assumed. Thus, the design of the space in front of the critical point derived from the polar system.

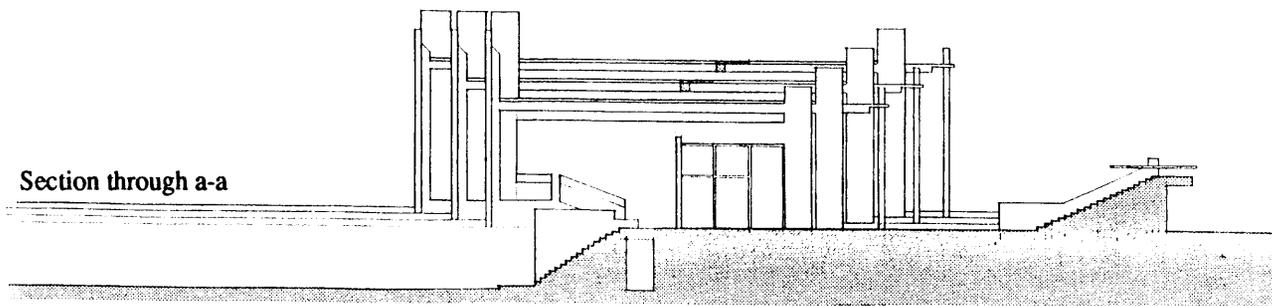
1. Bird's eye view from the surrounding mountain.



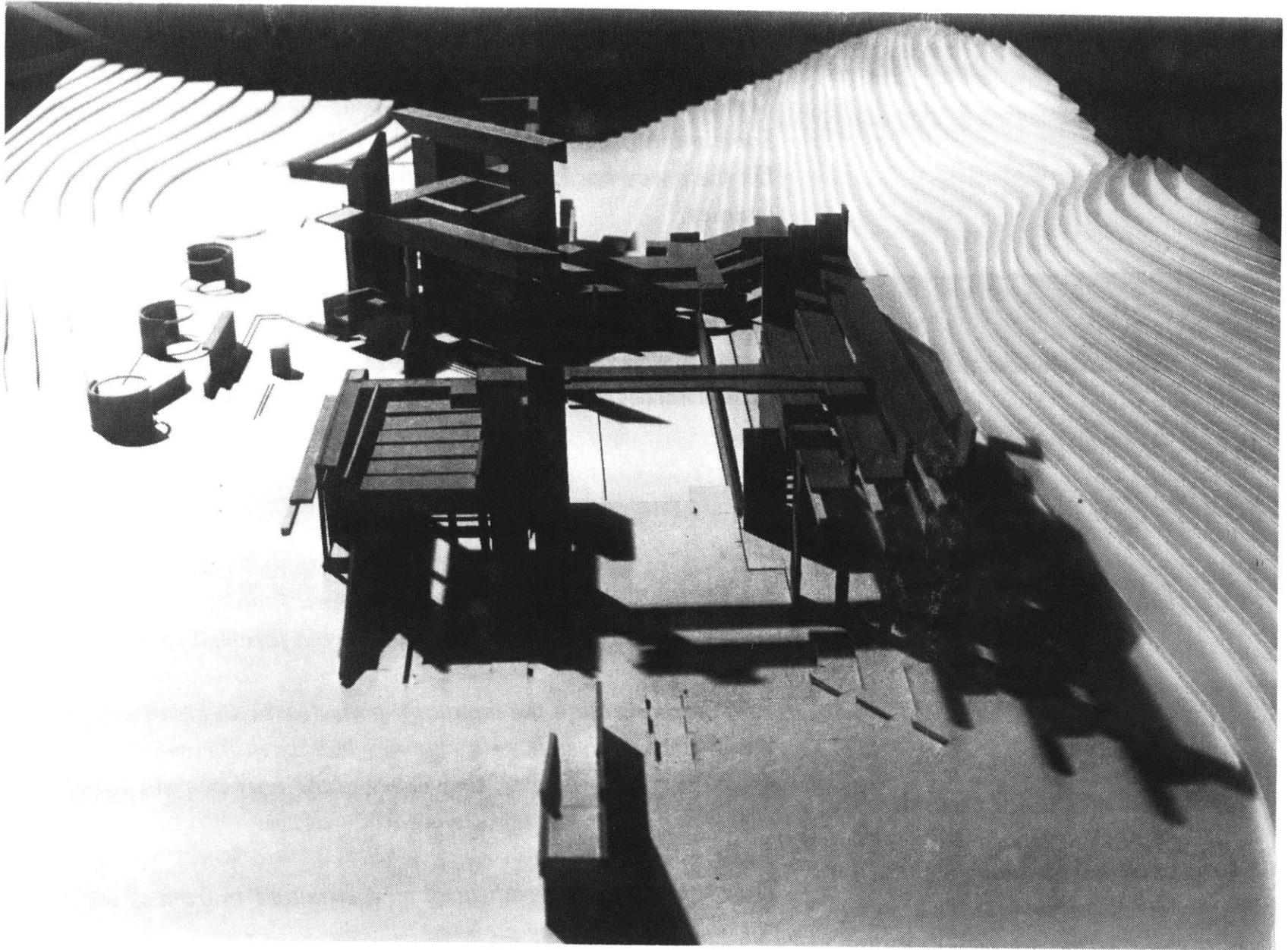
L-M

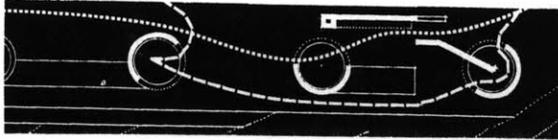
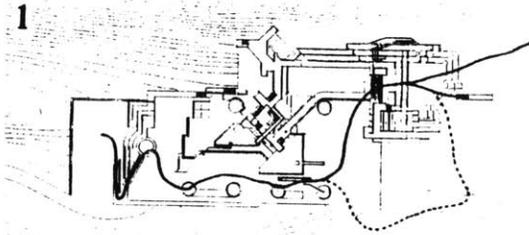
*They have the funeral ceremony .
Light shines through the slits of linear structures.
Nature streams through the windows.
All pray for the beloved's bliss.*

The structure of the chapels also has a directional quality. People's visions are fixed towards nature. In addition, the structure is not a blank concrete surface. It is fractured to accept light dramatically, like the delicate structure of Korean architecture under sunlight.



1. view from the top of the valley.





M-L-O-

*After the ceremony, they go their separate ways
Some wander up the stairway towards the summit of the valley
Some might travel further into the valley
On their way back, they repenetrate the space along different courses.*

People are not supposed to retrace their steps, so that their return trip possesses more meaning. They navigate through the space in different ways. From the outset, the whole site was treated as one body of space. The round structures on the intersections of the space grid system guide the movements.

M-L-N-

Cremating follows the funeral ceremony. Family and friends gather around the arena of waiting to bid farewell to the loved one.

Some walk through the mountain path nearby to meditate.

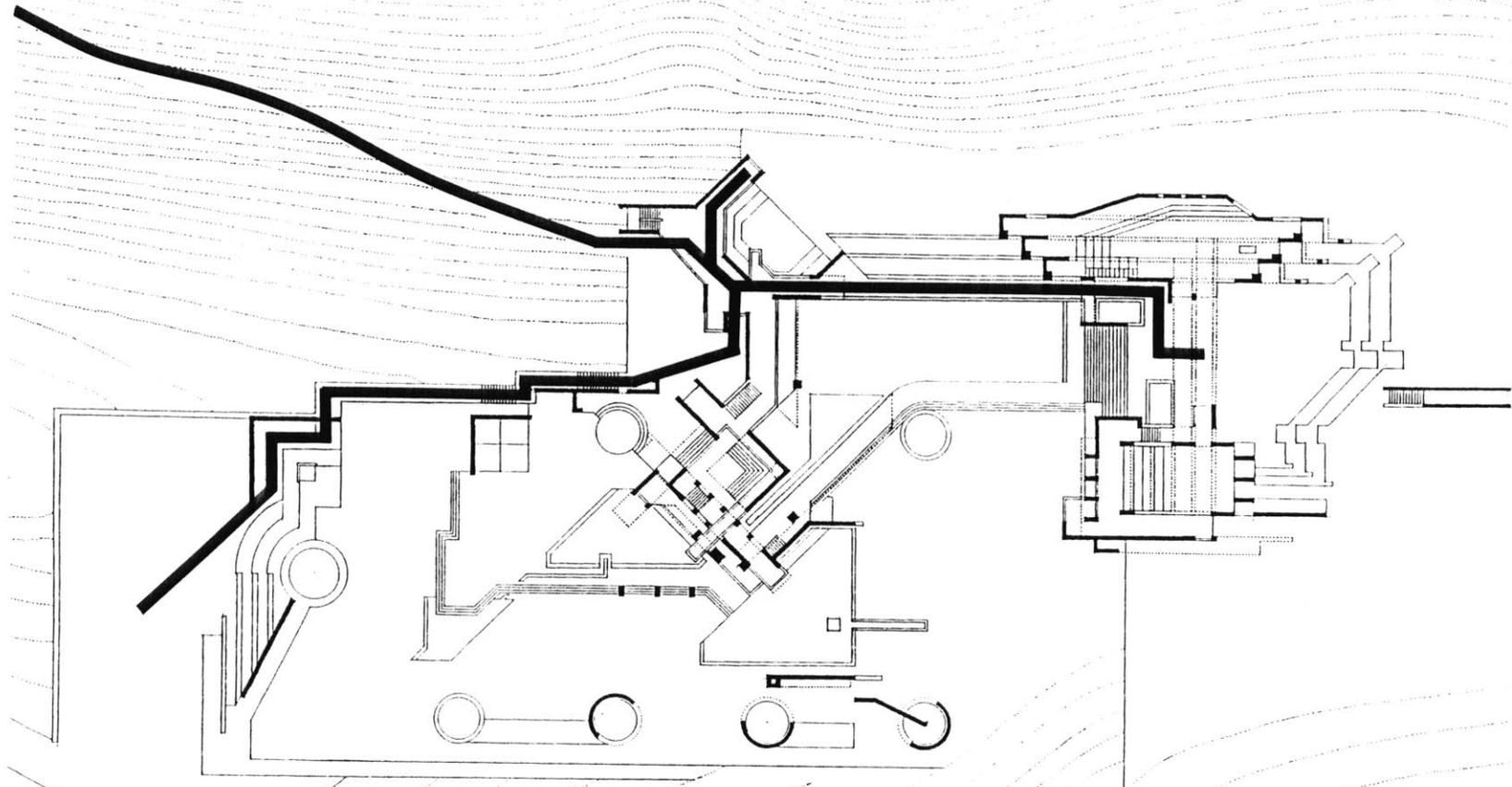
White smokes rises from a chimney hidden in the woods.

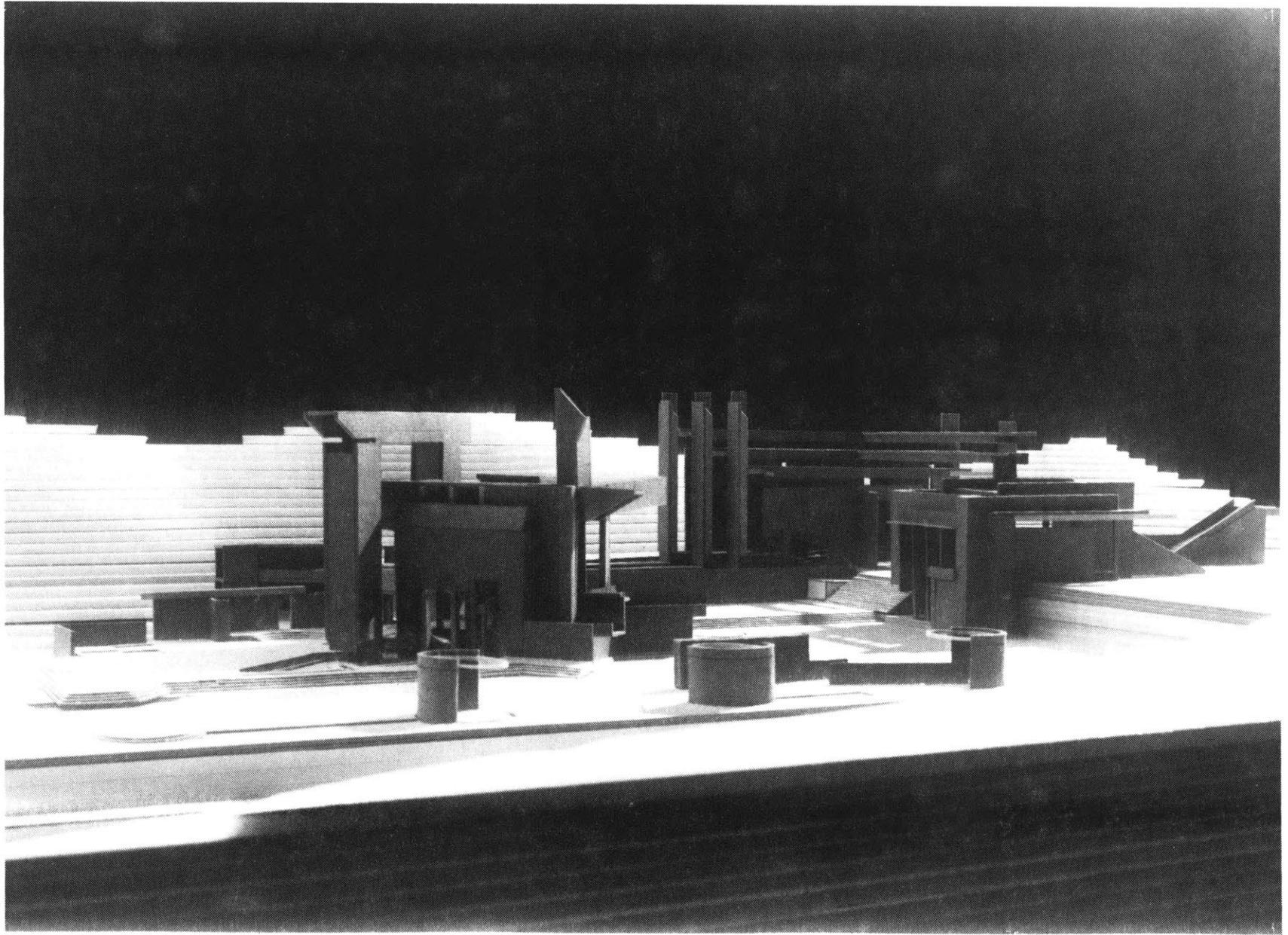
After everything is over, they descend the narrow path along the cliff. They never see the crematorium again.

1. Path after having funeral ceremony.
2. Path after having cremation by family and friends..

They are once more embraced by a structure in front of the parking lot , and they go home.

2



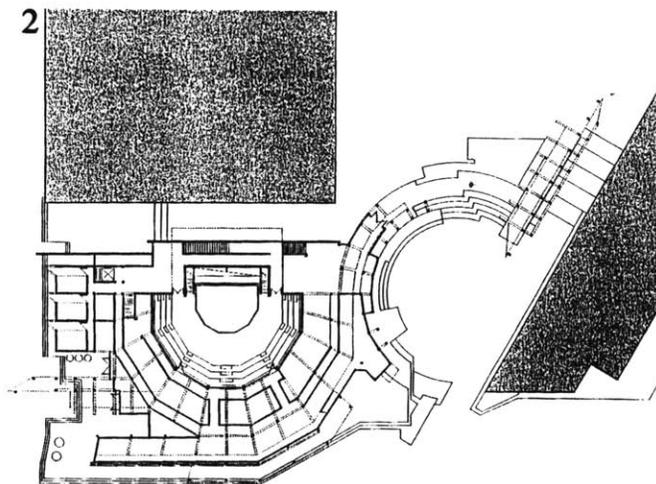
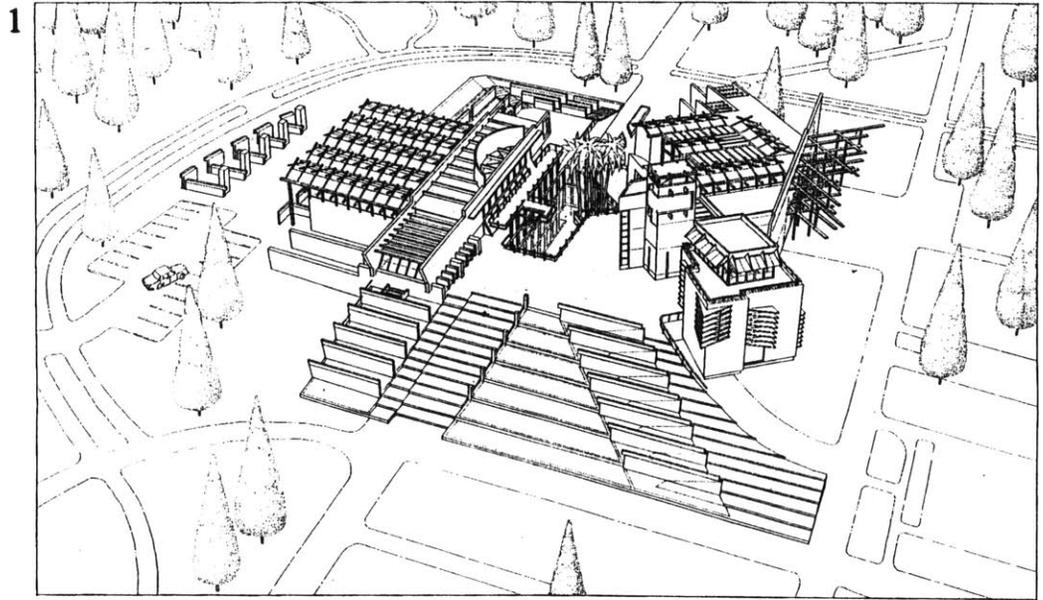


Postscript

I see two kinds of architects in the world - those who believe that good architecture comes from a good concept or prime generator and then those more advanced architects who believe that good architecture evolves from consideration for the experiential quality of space. However, strong concepts fascinate and their architects tend to become well-known. But they are apt to depend heavily on form, the sculptural quality of architecture.

The most decent architecture considers space and form as thoughtfully as did the Sooduk temple. The architecture of strong generators could make an architect's name but we cannot discern the mysterious process in which he captured the inspiration. Though the architecture of thoughtful consideration may not attract our attention at first, it is appreciated by the wise forever. Happily enough, the most profound architecture can be learned from the precedents in history.

During the early days at MIT, I reached a conclusion that my architecture had been that of strong concept and form. What had been missing in my design process was consideration for space itself. From then on, I have begun to look at architecture more critically. One day, I had the chance to discuss Korean houses with Professor Thomas Chastain in class. In comparing a Korean house with Alto's city hall, I began to understand the potential of Korean architecture. The different spatial approaches of the early and late temples especially fascinated me.



It is well known that ontogeny repeats phylogeny in biology. Through genetic programming, man experiences various stages of developments from the amoeba-like cell to the most advanced organism on the earth. While studying Korean architecture, I came to believe that Korean architecture maintained a very consistent evolution towards a spatial and experiential architecture. As an individual architect, I want to cultivate the process which enabled spatial Korean temples to evolve from diagrammatic plans. It is not an easy job to break an egg. As it is, it is also not easy for an architect to think in terms of the real media of architecture, space and experience. But I believe all architects must achieve this awareness some day.

1. First studio at MIT: Santa Babara University Museum, perspective.
2. Second studio at MIT: MIT theater, plan.

BIBLIOGRAPHY

Connelius van de Ven, *Space in Architecture*, Amsterdam: Van Gorcum Assen, 1978.

Mitsuo Inoue, *Space in Japanese Architecture*, New York: Weather Hill, 1985.

Glenn E. Wiggins, *Methodology in Architectural Design*, MIT Master of Science Thesis, 1989.

Takefumi Aida, *Takefumi Aida, Buildings and Projects*, New York: Princeton Architectural Press, 1990.

C. A. Doxiadis, *Architectural Space in Ancient Greece*, Cambridge: MIT Press, 1985.

Maurice Smith, *Dimensional Self-Stability and Displacement in Field-Ordered Directional Alterations, Places / volume 5. Number 2.*

Nigel Cross ed., *Developments in Design Methodology*, New York: John Wiley and Sons, 1984.

Eric Gunnar Aspland, "Woodland Crematorium", Tokyo: A.D.A., 1982.

Richards A. Etlin, *The Architecture of the Death*, Cambridge: MIT Press, 1980.

August Sarintz, *R. M. Schindler, Architect*, New York: Rizzoli, 1988.

Chang-Han Zoh, *A Comparative Study on the Spatial Composition in Architecture between Korean Buddhist Temples and Greek Temples*, Seoul National University, Ph. D Thesis, 1985.

Yung-Bae Ahn, *Exterior Space in Traditional Korean Architecture*, Seoul: Po-Chin-Chai Publising Co., 1980.

_____, A Study on the Architectural Space in Korean Buddhist Temples.,
Yonsei University, Ph. D Thesis, 1984.

Bong-Ryol Kim ed., Korean Architecture, Seoul: Space Group, 1988.

_____, A Study on the Building Composition and Site Layout of Buddhist
Architecture in Chosun Era through the Dogmatic Interpretation, Seoul National
University, Ph. D Thesis, 1989.

Chang-Sup Yoon, History of Korean Architecture, Seoul: Dong-Myung sa,
1984.

Jae-Pil Choi, Moderization and its Impact on the Internal Spatial Organization of
the Traditional Korean House, Gergia Institute of Technology, Ph. D thesis,
1987.

Byeong-Seon Pae, A Comparative Study on the Organization of Elements in
Korean Buddhist Architecture, Seoul National University, M. S. Thesis, 1986.

In-Kuk Jung, The Style and Structure of Korean Architecture, Seoul: Il-Ji Sa,
1974.

Nam-Chul Ju, The Korean Residential Architecture, Seoul: Il-Ji Sa, 1980.

Young-Hoon Shin, The Traditional Residence of Korea, Seoul: Yeul-Wha
Dang, 1983.